

BBC MICRO·MASTER·ELECTRON·ATOM

£1.25

# ACORNUSER

OCTOBER 1986

BIGGEST AND BEST-SELLING BBC/ACORN MAGAZINE

## COMPACT: ACORN'S NEW MICRO

**SCHOOL FOCUS:**  
Logo, networks  
and parents

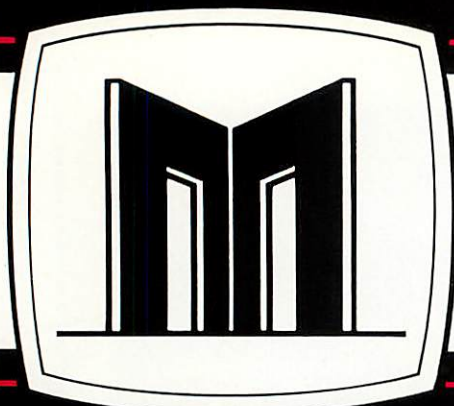
**SPIDER:**  
The ultimate  
curve plotter



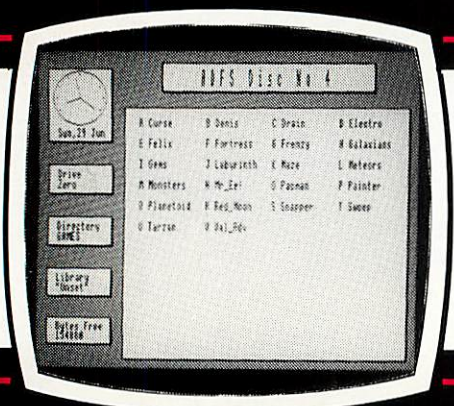


# BEEBUG

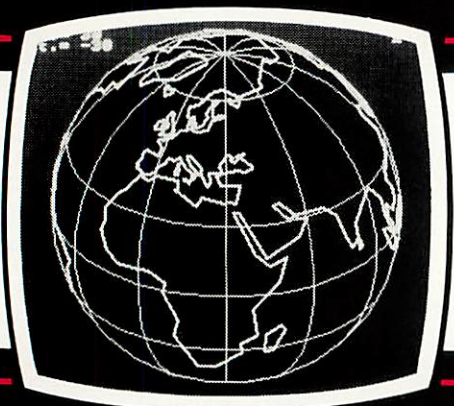
# BEEBUG



**FOR YOU AND  
YOUR BBC & MASTER  
COMPUTER**



**BRITAIN'S LARGEST  
INDEPENDENT COMPUTER  
USER GROUP**



**MAGAZINE ★ SOFTWARE ★  
DISCOUNTS ★ TECHNICAL SUPPORT ★  
SHOWROOM ★ SPECIAL OFFERS ★  
FREE ADS ★ INSURANCE**

I would like to enrol as a member of BEEBUG for 1 year and receive the next 10 issues of BEEBUG magazine.

SURNAME \_\_\_\_\_ INITIALS \_\_\_\_\_ TITLE \_\_\_\_\_

ADDRESS \_\_\_\_\_

POSTCODE \_\_\_\_\_

SIGNATURE \_\_\_\_\_

I enclose £ \_\_\_\_\_ (enter correct amount\*) OR  
Please debit my Access/Visa Account £ \_\_\_\_\_

Card Number

Card Expiry Date \_\_\_\_/\_\_\_\_/\_\_\_\_

**FOR A FREE BEEBUG  
INFORMATION PACK  
PHONE 0727 40303**

UK, Eire and BFPOs	£12.90
Rest of Europe	£19.00
Middle East	£22.00
America & Africa	£24.00
Elsewhere	£26.00

All payments MUST be in pounds sterling. Cheques MUST be drawn on a UK bank.

**EITHER** Post today to BEEBUG,  
Dolphin Place, Holywell Hill,  
St. Albans, Herts, AL1 1EX  
**OR** Phone St. Albans (0727) 40303





# MICRO MEDIA

0707 52698 or 0707 50913

## Computer Supplies

Rydal Mount, Baker Street,  
Potters Bar, Herts EN6 2BP

### UNBRANDED 5¼" DISCS

Certified lifetime warranty  
hub rings, envelopes, labels

Prices per 10 Discs 10+ 30+

Tracks	10+	30+
SS/DD 40	7.50	6.80
DS/DD 40	9.00	8.20
DS/DD 80	9.50	8.70

### 3M 5¼" Lifetime Guarantee

	Lifetime	Guarantee
SS/DD 40	11.90	11.00
DS/DD 40	14.00	13.20
SS/DD 80	17.50	15.50
DS/DD 80	18.70	16.50

### 3M 3½" TPI

	135	18.50
SS/DD 135	21.90	18.50
DS/DD 135	30.20	25.50

### VERBATIM DATALIFE

	12.80	12.40
SS/DD 40	12.80	12.40
DS/DD 40	15.80	15.40
SS/DD 80	15.80	15.40
DS/DD 80	20.50	20.10

### COMPUTER LABELS

Continuous fanfold	Price per 1000
sprocket fed	1,000 2,000+
70 x 36	4.40 4.00
89 x 36	4.50 4.10
89 x 49	6.20 5.70
102 x 36	4.70 4.40

Please state no of labels across  
sheets (1 2 or 3)

### 9½" BACKING SHEET FOR FIXED TRACTOR

	PRICE PER 1000
70 x 36 3 across	4.00
89 x 36 2 across	6.60
102 x 36 2 across	6.70

### ENVELOPES

Size	Weight 1000s gsm per Bx	Price per box
110 x 220 4¼x8½"		
White Self seal	500	11.90
90gsm		
Manilla Banker		
Gummed 70gsm	500	9.90
Bond		
324x229 12¾"x9"		
Manilla self seal	250	17.90
90gsm		

### COMPUTER PAPER

Plain, fanfold, micro perf edges

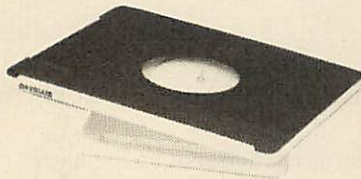
Size	Weight 1000s gsm per Bx	Price per box
11 x 9½"	60 2	13.00 12.20
	80 2	16.20 14.60
EXACT A4	70 2	21.50 18.90
11½ x 9¼"	90 1	13.70 11.50
EXACT A4 Fixed Tractor Feed		
11½ x 9½"	80 1	16.75 14.20
	100 1	29.00 27.50

### PRINTER LEAD

Centronics lead to connect BBC to  
EPSON KAGA CANON etc

1 mtr - 6.50
2 mtr - 8.50

### SWIVEL BASES FOR MONITORS

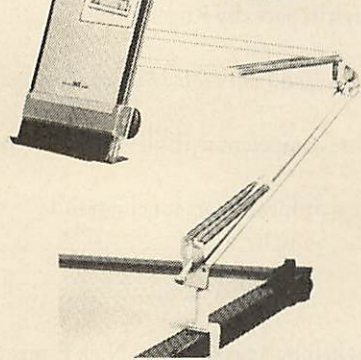


Pan tilt revolves around 360°  
12.5° tiltable up and down  
Adjustable by inside screw.

12" MONITORS £14.00  
14" MONITORS £17.50



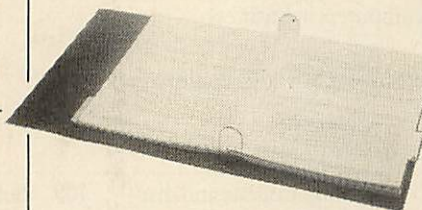
A4  
COPY  
HOLDERS



Adjustable with arm £19.80  
Desktop £13.00

Magnifying cursor line  
Paper height adjustable clip  
Paper thickness adjustment

### PRINTOUT BINDERS



Adjustable hardback ring binder  
for 11 x 9½" 12 x 9¼" con't paper  
40mm paper capacity  
BLUE RED or BLACK  
£4.90 each  
set/5 indexes £2.30

### PRINTER RIBBONS

Mixed types for quantity breaks, 1 &  
2 off's if ordered with other  
products.

	3+	6+
ACORN AP 80	2.95	2.40
AP100	2.95	2.40
INK JET CART	7.50 per 4	
BROTHER HR 5	3.00	2.80
M1009	3.70	3.20
HR15 MS	3.50	3.00
HR15 Fabric	3.60	3.10
CANON PW1156/1080	3.40	2.90
Red Brown Blue Green	5.30	4.70
CENTRONICS G.L.P.	3.70	3.20
DAISYSTEP 2000 M/S	3.10	2.60
Fabric	4.90	4.20
EPSON FX/MX/RX 80	3.00	2.60
Red Brown Blue Green	4.20	3.50
LX 80	3.00	2.60
Red Brown Blue Green	4.20	3.50
JUKI 6100 MS	2.50	2.10
6100 SS	1.60	1.30
Red Brown Blue	2.50	2.10
2200 Fabric	3.70	3.40
2200 SS	3.10	2.75
2200 corr	4.00	3.60
KAGA KP810/910	3.40	2.90
Red Brown Blue Green	5.30	4.70
M/TALLY MT 80 M/S	4.00	3.20
NEC PC 8023	3.60	3.00
OKI 80/82	1.60	1.30
Red Brown Blue	2.40	2.00
PANASONIC KXP 110	7.50	6.30
QUENDATA 2000 MS	3.10	2.60
Fabric	4.90	4.20
SEIKOSHA GP 80	2.95	2.40
GP 100/250	2.95	2.40
GP 500	3.90	3.30
SHINWA CP 80 M/S	4.00	3.20
SMITH CORONA		
EL 1000/2000 M/S	8.50	7.90
Fabric	3.90	3.60
Correctable	5.00	4.70
STAR GEMINI 10x 15x	1.60	1.30
Red Brown Blue	2.40	2.00
NL 10	5.60	4.90
WALTERS WM80 M/S	4.00	3.20

If the ribbon you require is not listed  
ring 0707 52698 and let us quote

### DISC MAILERS

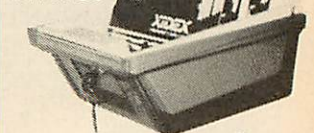
	Price each	50+	100+
Rigid Cardboard			
holds up to 3 discs	40p	28p	



MM 70L  
5¼ x 70



MM50L  
5¼ x 50



MM40L  
3½ x 40



Rexel Mini  
Disc Box 30.



5¼ x 30  
Brown smoked  
Tilt lid. Cream plastic base

Plastic  
Library  
Case  
5¼ x 10



### DISC BOXES

MM 100	5¼ x 100	11.90
MM 70	5¼ x 70	10.90
MM 50	5¼ x 50	8.90
MM 40	3½ x 40	8.90
Mini Box Rexel	5¼ x 30	5.00
Library Case	5¼ x 10	1.50
All MM boxes anti-static with lock.		

### DISC CARE

5¼" Head Cleaning Disk with 15ml cleaning solution	5.50
---	------

● Educational and HMG orders accepted. ● Trade enquiries. ● Personal callers welcome.



ALL PRICES INCLUSIVE OF POSTAGE & PACKING  
Please add VAT at 15%



24-Hour  
Credit Card  
Orders

0707 52698

MICROMEDIA-MICROMEDIA-MICROMEDIA-MICROMEDIA-



# ACORNUSER

ISSUE No 51 OCTOBER 1986

EDITOR  
Tony Quinn

TECHNICAL EDITOR  
Bruce Smith

SUB-EDITORS  
Julie Carman  
Shona McIsaac

EDITORIAL SECRETARY  
Colette Curley

TECHNICAL ASSISTANTS  
David Acton  
David Lawrence

ART DIRECTOR  
Mike Lackersteen

ART EDITOR  
Liz Thompson

ASSISTANT ART EDITOR  
Paul Holmes

GROUP ADVERTISEMENT  
DIRECTOR  
Stefanie Blower

ADVERTISEMENT MANAGER  
Simon Goode

SALES EXECUTIVE  
Thomas Rashid

MERCHANDISING MANAGER  
Sarah Bullard

PUBLISHING DIRECTOR  
Michael Potter

EDITORIAL DIRECTOR  
Christopher Ward

## NEW USERS

HINTS AND TIPS:	49
Martin Phillips turns his hand to fitting ROMs on the Electron, BBC micro and Master	
FIRST BYTE:	55
Tessie Revivis concludes her articles on machine code for beginners	

## REVIEWS

GAMES:	132
<i>Spy Hunter</i> from US Gold, Artic Computing's <i>Woks</i> and <i>Hampstead</i> by Melbourne House	
GAMES:	133
<i>Twin Kingdom Valley</i> from BugByte and Artic Computing's <i>The Great Wall</i>	
ROMS:	135
Simon Williams compares three cross assemblers	
SOFTWARE:	139
The <i>Swift</i> spreadsheet is put through its paces by Roger Carus	
BOOKS:	141
<i>Master Reference Manual Parts 1 and 2</i> ; and <i>The New Hackers Handbook</i>	
HARDWARE:	143
The Multiform Z80 is aimed at those competent with CP/M – Ed Brown investigates	
SOFTWARE:	146
Chris Drage has the word on three wordprocessors for children	

## EDUCATION

EDUCATION NEWS:	151
What's new in the world of micros in the classroom from Nick Evans	
HOME FROM SCHOOL:	154
Chris Drage and Nick Evans discuss educational programs for use at home	

## BUSINESS

THE NETWORK PAGE:	161
Robin Newman presents ideas for people using networks of Acorn micros	
BUSINESS NEWS:	173
All the latest for users of Acorn computers in business	
SPELLING IT OUT:	177
Rob Macmillan explains how Acornsoft put a large dictionary on a chip	

## REGULARS

News	7	Listings cassette and disc	109	Software charts	131
Letters	43	Magazines and binders	110	Acorn forum	183
Magazine subscriptions	52	Special software offer	111	User groups	193
Logotron Pendown offer	92	Special discs offer	112	Free ads	197
Competition	107	Yellow pages	113	Small ads	199
ROM offer	108	Order form	129	Acorn Abuser's Diary	200

Subscriptions: Contact Christine Allen, Redwood Publishing Ltd, Lambourn Woodlands, Newbury, Berks. Tel: (0672) 40888. UK £17.50; Europe £25; Middle East £30; Americas, Africa £35; rest of the world £40; (prices include p&p for 12 issues). Published by Redwood Publishing Ltd, 141-143 Drury Lane, London WC2B 5TF. Tel: 01-836 2441. Printed by Watmoughs Ltd, Bradford. Typesetting and colour reproduction by Transcript, London. Print production by Aquarius Print and Design, London. Distributed to the news trade by Comag, Tavistock Road, West Drayton, Middlesex UB7 7QE.





## FEATURES

### WELCOME THE MASTER COMPACT

15

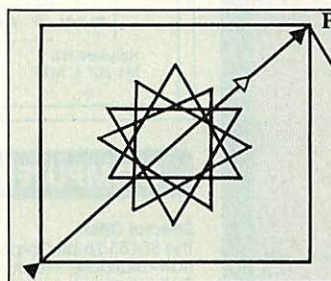
The Master Compact is Acorn's exciting new micro priced at only £399. Read our five-page in-depth assessment of it, starting on page 15



### TURTLE GRAPHICS GROWS UP

81

Joe Telford extends the facilities of Logo's turtle graphics using the *Graphics Extension ROM* or the Master



### ART TO ART CONVERSION

88

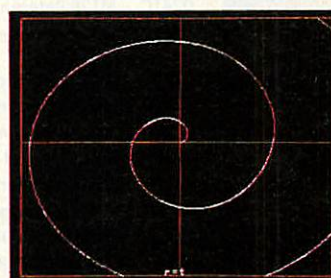
Convert graphics screens from one high resolution mode to another with Phil Wilkes' software



### SPIDER POWER

93

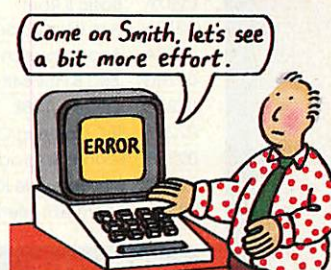
David Johnson-Davies and David Deutsch present their *Spider* curve-plotting program to plot almost any equation



### SIDEWAYS SOLUTION

102

How to handle errors using sideways RAM is Steve Picton's topic for readers who write their own software



## COVER



Cover photograph by John Barlow

## NEXT MONTH

### GRAPHICS GALORE

SuperPlot – 3D wire-framing from the author of SuperPainter  
On the move: dual screens for smooth animation  
Plus full in-depth reviews of the new Master Compact and InterWord

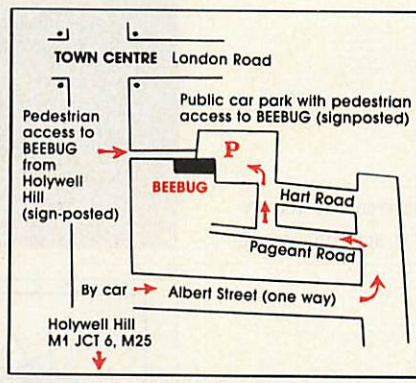


# BEEBUG SHOWROOM AND MAIL ORDER

The products in this price list are available in our showroom in St. Albans and by mail order. Telephone your order on 0727 40303 or send the order form to the address below. Alternatively come along and see us. We are open 9 - 5.30 Mon - Sat, and there is ample parking at the rear of our premises.

We take both Access and Visa credit cards. Simply telephone us on our multi-line telephone number 0727 40303 quoting: Cardholder's Name, Cardholders Address, Cardholder's Telephone number, Credit Card number, expiry date, order details.

PLEASE NOTE: that the mail order despatch address must be the same as the cardholder's address.



**BEEBUG MAIL ORDER**  
Dolphin Place, Holywell Hill,  
St. Albans, Herts. AL1 1EX  
Tel: 0727 40303 - Multi-lines

- Computers
- Printers
- Monitors
- Disc Drives
- Budget Discs
- Software

## COMPUTERS

**Special Offers**  
The 80186 16-bit Co-processor for the Master 128 is now available. It features DOS+ and the GEM Collection as bundled software and is priced at £395. Basic II, which offers extra commands over the original, is now ex-stock at under £20.

Code	Description	Price Inc VAT
0200G	Master 128	489.00
0202G	Master ET	389.00
0230C	65C102 Co-Proc 6502 "Turbo"	119.00
0231D	80186 Co-Processor	395.00
0232D	32016 Co-Proc (When Available)	899.00
0234B	M128 Econet Module	47.00
0235B	M128 Eprom Cartridge	14.00
0240C	M128 Reference Manual 1 ADJ22	14.50
0241C	M128 Reference Manual 2 ADJ23	14.50
0242C	M128 Advanced Ref Manual ADJ24	19.50
0203F	'6502' 2nd Processor	189.00
0204F	'Z80' 2nd Processor	365.00
0205F	Acorn Prestel Adaptor	134.00
0206F	Acorn Teletext Adaptor	144.00
0217B	1770 Disc Interface Kit	48.00
0218A	ADFS Upgrade for 1770 DFS	29.00
0219B	Watford 1.43 DFS Kit	62.00
0214B	Watford DDFS Kit + Manual	60.00
0209A	1.2 DNFS Rom	19.50
0207A	Basic II Rom	19.50
0210A	A to B Upgrade Kit	69.00
0212A	Acorn Speech Upgrade	46.00
0220G	BBC B Plus 64K	459.00
0221G	BBC B+ 128K	489.00
0224F	BBC Carrying Case	14.95
0225B	Econet Upgrade for Model B	48.00
0226B	64K Upgrade Kit for B+ 64-128K	39.00
0237F	Acorn IEEE Interface	322.00

## PRINTERS

**Special Offers**  
The Taxan KP810 is still our most popular dot matrix printer and we highly recommend it for graphics, quick listings and NLQ-type letters, making it one of the most versatile printers available. Used in conjunction with the Fontaid package it becomes a very powerful tool.

Code	Description	Price Inc VAT
0311G	Kaga KP 810	255.00
0304G	Epson LX 80	225.00
0313C	LX80 Tractor Feed Unit	22.00
0315D	Cut Sheet Feeder for LX80	55.00
0316G	Taxan KP910 15" Printer	390.00
0319G	Epson FX85 NLQ Printer	438.00
0320D	FX85 Tractor Feed Unit	30.00
0321D	FX85 Sheet Feeder	130.00
0300G	Brother HR15XL Parallel Daisywheel	400.00
0301G	Brother HR15XL Serial Daisywheel	400.00
0310G	Juki 6100 Daisywheel	360.00
0309F	Ibico LTR1 Letter Quality	132.00
0302G	Canon PW/156A 15"	405.00
0303G	Canon PJ1080A colour	520.00
0308G	Epson JX 80 colour	520.00
0318G	Epson HI 80 Plotter	380.00
0305G	Epson RX 100	392.00
0306G	Epson FX 80	273.00
0307G	Epson FX 100	490.00
0340G	Plotmate A4 1200-001/80	340.00
0341G	Plotmate A4M	455.00
0342G	Plotmate A3M	625.00
0401A	2M Printer Lead	8.00
0402A	Epson FX/RX/MX80/FX85 Ribbon	3.00
0403A	Epson FX/RX100/FX105 Ribbon	4.00
0408A	Canon PW/Kaga Taxan Ribbon	5.00
0409A	Black Cartridge PJ1080A	7.00
0410A	Colour Cartridge PJ1080A	10.00
0413A	LX 80 Replacement Ribbon	4.50
0414A	Ibico Ink Roller	4.60
0415A	Epson JX80 Ribbon	14.90
0416A	Dust Cover KP810/PW1080A	5.45
0418A	Juki 6100 S/S Ribbon	1.55
0406D	11"x9.5" Paper 2000 70gsm	14.50
0407C	3.5" 1 7/16" Labels 1000	4.00
0453G	2-part NCR Listing Paper (1000)	23.00
0419C	"Fontaid" ROM & Disk 40T	30.00
0420C	"Fontaid" ROM & Manual 80T	30.00
0421B	"Fontaid" Extra Disc "A" 40T	15.00
0422B	"Fontaid" Extra Disc "A" 80T	15.00
0435C	MX80 Printhead Assembly	41.00
0437C	RX80/80FT Printhead Assembly	41.00
0438C	FX100/105 Printhead Assembly	57.00
0439C	LX80 Printhead Assembly	41.00



## MONITORS

### Special Offers

The Taxan monitors are still the most popular monochrome monitors, although the Zenith range, costing around £90, are still the best budget buy. The Microvitec 1451 is the recommended RGB monitor as it easily handles 80 column text and is priced at only £260.

Code	Description	Price Inc VAT
0500H	Kaga KX1201 Green Short Pers.	102.99
0501H	Kaga KX1202 Hi-res Green Monitor	116.00
0502H	Kaga KX1203 Hi-res Amber Monitor	116.00
0556A	Taxan 1201/2/3 Lead BNC	3.90
0503G	Zenith 123 12" Green	83.00
0504G	Zenith 122 12" Amber	87.00
0530H	Microvitec 1431 Med-res Monitor	206.00
0531H	Microvitec 1451 Hi-res Monitor	260.00
0550A	1.0m Monitor Lead RGB	5.75
0535H	Supervision III RGB	378.00
0555A	Supervision Monitor Lead	7.00
0551E	Single Master Plinth	16.10
0552E	Single Plinth for Monitor	12.65
0553F	Double Plinth for Monitor	23.00

## DISC DRIVES

### Special Offers

Cumana disc drives are on special offer for a limited period and while stocks last. The CD800S is exceptional value at only £274. The disc starter pack, which is all you need to upgrade to disc, contains a Cumana CSX100 drive, Acorn 1770 Disc Interface and 10 48 tpi discs all for £163.

Code	Description	Price Inc VAT
0600F	Cumana 100K CSX100 40T	104.00
0610F	Cumana 100K CS100 40T	125.00
0601G	Cumana 200K CDX200 40T	215.00
0602F	Cumana 400K CSX400 40/80T	141.00
0603F	Cumana 400K CS400 40/80T	160.00
0604G	Cumana 800K CD800S 40/80T	274.00
0614F	Cumana CS100E Excl Accessories	117.00
0615F	Cumana CS400E Excl Accessories	155.00
0222F	Disc Starter Pack	163.00
0611A	Cumana Disk Drive Guide	1.50
0650B	Memorex discs S/S D/D 48TPI 5210	15.50
0651B	Memorex Discs D/S D/D 96TPI 5420	25.50
0652A	Memorex Disc Head Cleaning Kit	9.65
0653A	Library Case - 10 discs	2.25
0654C	Disc Storage Box - up to 50 discs	9.00
0656D	Lockable Disc Box (80)	17.00

## SOFTWARE

### Special Offers

New items this month include Movie Maker as reviewed in Beebug Vol 5 No 2 and the latest game from Superior Software, Thrust at only £11.

Code	Description	Price Inc VAT
1022C	View 3.0 Rom	69.00
1000B	Acornsoft View 2.1	45.00
1013B	View Printer Driver Cassette	8.00
1014B	View Printer Driver Generator Disk	9.00
1001B	Acornsoft View Sheet	45.00
1002B	Acornsoft Hi-View	45.00
1019B	Acornsoft Viewstore Rom	45.00
1021A	Acornsoft Viewindex Disc	11.00
1043B	Acornsoft Viewspell Rom/Disc	33.00
1003A	Acornsoft Lisp Rom	48.00
1004A	Acornsoft BCPL	51.00
1026B	BCPL Standalone Generator	48.00
1005B	Acornsoft Comal	48.00
1006B	Acornsoft Logo	65.00
1007C	Acornsoft ISO Pascal	65.00
1028B	Pascal Standalone Generator	32.00
1008B	Acornsoft Basic Editor	28.00
1012B	Acornsoft Elite Disc Version	17.00
1023B	Acorn Elite Cassette	14.00
1015B	Acornsoft Revs Disc	17.00
1024B	Acornsoft Revs Cass	14.00

1016B	Acornsoft Aviator Disc	17.00
1044B	Acornsoft Aviator Cassette	14.00
1017B	Acornsoft GXR Rom B	28.00
1018B	Acornsoft GXR Rom B+	28.00
1027C	Micro Prolog	74.00
1029A	Revs 4 Tracks Disc	11.95
1032B	Revs 4 Tracks Tape	9.00
1026B	BCPL Standalone Generator	48.00
1031B	Acornsoft Termlator Rom	30.00
1033B	Microtext Disc	53.00
1034C	Microtext Plus Rom	240.00
1035B	6502 Development Pack	45.00
1038B	Acornsoft Database Disc	14.50
1040C	Micros In Business Disc	65.00
1041B	Acornsoft Forth Rom	48.00
1042B	Acornsoft Forth Disc	19.00
1100C	Wordwise Plus	46.00
1112A	Hi Wordwise Plus Disc	5.75
1102A	Wordwise	28.00
1103B	C.C. Graphics ROM	25.00
1104B	Printmaster (Epson)	28.00
1105B	Printmaster (Star)	28.00
1106B	Accelerator	56.00
1115B	Speech System Inc TTS	33.50
1107B	Speech ROM	28.00
1108A	Acorn Speech Processor (With 1107)	10.00
1109B	Disc Doctor	27.00
1110B	Intersheet	47.70
1111A	Hi Intersheet Disc	5.75
1113B	Caretaker Rom	28.00
1114B	Interchart	29.90
1117B	Interword	47.00
1123A	SPEECHI Disc 40/80T	11.95
1124A	Citadel 40/80 Track Disc	11.95
1125A	White Knight Mk12 Disc	18.40
1126B	White Knight Mk12 Cassette	9.50
1127A	White Knight Mk12 for 1770 DFS	18.40
1129A	Thrust	11.00
1130A	Repton2	11.95
0703B	AMX Mouse	74.00
1150B	AMX Desk Disc	19.00
1151B	AMX 3D Zicon Disc	19.00
1152B	AMX Database Disc	19.00
1153B	AMX XAM	19.00
1154C	AMX Pagemaker Plus	40.00
1155B	AMX Superart Rom	40.00
1156B	AMX Paint Pot Disc	10.99
1170D	Fleet Street Editor 40T	34.00
1171D	Fleet Street Editor 80T BOPS2	34.00
1172A	Mini Office II Cassette	14.50
1173A	Mini Office II 40T	16.50
1174A	Mini Office II 80T	16.50
1175A	Clares Replica III	15.00

## OTHER HARDWARE

### Special Offers

The ATPL Sideways board is still the best way of adding extra rom space to your model B, although the Watford 12 Rom is a cheaper equivalent. As

the Voltmace joysticks are proving so popular we have extended the special price for this month.

Code	Description	Price Inc VAT
0701A	Aries B32 RAM Card	86.00
0702A	Watford 32K RAM Card	65.00
0704A	ATPL ROM Board for Model B	39.00
0735A	ATPL Battery Backup kit	17.00
0740B	Aries B12 Rom Board	45.00
0749A	Aries B12C Adaptor	5.75
0705A	2764 8K eprom	3.45
0706A	27128 16K eprom	4.60
0707A	6264 8K ram	4.50
0708A	Eprom Extractor Tool	3.45
0709D	Watford Eprom Eraser	32.20
0710B	Soffille Eprom Blower	75.90
0711D	Nightingale Modem	120.00
0712A	Pace Constarr	30.00
0714A	BBkey Function Key Labels	2.00
0715A	Dust Cover for BBC B/B+	2.99
0734A	Dust Cover for Master 128	4.60
0716F	Music 500	114.00
0717A	Watford Sideways ZIF	17.25
0718B	Voltmace Delta 3B Single J'stick	10.00
0719B	Voltmace Delta 3B Twin Joystick	17.00
0720B	Voltmace Delta 14B Joystick	12.50
0721B	Voltmace Delta 14B/1 Interface	12.50
0741A	Voltmace Delta ASC/B	8.50
0731A	4-core RS423 Cable	0.60
0736A	Watford 12 Rom Board	36.80
0750B	Watford Solid State 16K RAM	32.20
0751B	Watford 16K RAM Module	33.35
0753B	Rom/Ram Board with 64K DRAM	78.20
0754B	Rom/Ram Board with 128K DRAM	121.90
0761E	Nightingale/Commstar Combo	135.00
0762E	Beebug Magic Modem	95.00
0763E	Beebug Magic Modem + Software	109.00

## CARRIAGE

Carriage is denoted by the letter contained in the stockcode, A-50p, B-£1, C-£2, D-£3, E-£4.50, F-£5.50, G-£7.

When ordering several items, use the highest price code plus half of each subsequent code, up to a maximum of £7. For courier delivery use code G.

Overseas customers please send the same amount. The VAT will be used to cover the extra postage and insurance.

BFPO customers deduct VAT from the goods purchased and add UK postage.

# ORDER FORM

## BEEBUG MAIL ORDER

Dolphin Place, Holywell Hill,  
St. Albans, Herts. AL1 1EX

(Dolphin Place is opposite  
18 Holywell Hill in the centre  
of St. Albans).

CODE	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
NAME:			SUB TOTAL	£
ADDRESS:			CARRIAGE	£
			TOTAL	£
ACCESS/BARCLAYCARD NO:				

In accordance with our competitive pricing structure prices are subject to alteration at any time.



# CUB'S COLOURFUL MASTER PIECE



A corn's BBC Master Series bring exciting new levels of sophistication to a proven family of micro computers. Unfortunately, not all monitors on the market can do justice to the Master Series' colour display capabilities.

That's why more BBC users choose a Microvitec CUB colour monitor than any other – because every model in the CUB family is a masterpiece of high performance British design. The clarity, depth of colour and rock steady image seen on a CUB display allows the user to exploit graphics and text to the full – just ask for a demonstration of a CUB alongside someone else's monitor and you'll be totally convinced.

In the meantime, the picture above amply demonstrates why a CUB is a delight to the eye in more ways than one.

Model	Resolution	Screen	Bandwidth	Application
1431/DS4	Standard 452(H) x 550(V)	–	18 MHz	Education, Home, Colour graphics use
1451/DS4	Medium 653(H) x 550(V)	Anti-glare	18 MHz	80 column, text-processing. High quality graphics.
1441/DS4	High 895(H) x 550(V)	Anti-glare	18 MHz	High-resolution graphics and text applications.

Available with tilt and swivel option. Also available are Microvitec's range of popular BBC-compatible metal cabinet monitors 1431/MS4, 1451/MS4, 1441/MS4.

## TOUCH SCREEN OPERATION

Touchtech 501, designed for operation with all CUB metal cabinet monitors – the ultimate in user friendliness.

### BBC COMPATIBLE

For free, full colour brochure contact



**MICROVITEC**  
**cub**  
**COLOUR MONITORS**



Futures Way, Bolling Road, Bradford BD4 7TU, West Yorkshire.  
Tel: (0274) 390011/726500. Telex: 517717 MVITEC G.

Available from High Street Computer Retailers and branches of W. H. Smith, Boots, John Lewis Partnership, Laskys and Currys.



# NEWS

## Hot Sahara

Survival in Africa is the theme of *Sand Harvest*, a role-playing game which simulates life on the edge of the Sahara and shows why the desert is spreading.

The disc costs £25 plus VAT, the network version is about £35. CWDE, Regent's College, Inner Circle, Regent's Park, London NW1 4NS.

## Library system

Edlib is a software system for the MEP bar code reader designed to run a library for an average school with up to 65,000 books for 2500 students.

Contact Addison Wesley, Finchampstead Road, Wokingham, Berks RG11 2NZ.

## Prizes for projects

£8000 of prize-money is up for grabs in the 1986-7 Computer Applications Competition, run by the University of Kent and sponsored by Barclays Bank.

Details from University of Kent Computing Lab, Canterbury, Kent CT2 7NF.

## Blunder Box

In the September issue there was an error in Joe's Jottings listings 8 and 9 (pages 122 and 123). To come up with the right listings swap lines 350 to 680 on listing 8 with lines 350 to 560 on listing 9 and re-enter line 340 as follows:

Listing 8:  
340 FOR loop%=  
min TO max  
Listing 9:

```
340 PRINTm$(loop%);STRING$(len-LEN(m$(loop%)),  
" " );
```

The discs and tapes are correct.

There was also a mistake in Mike Rawlings ROMFILE listings - if you can't wait for the corrections to be printed next month, send us an sae.

# Acorn gives birth to Master Compact

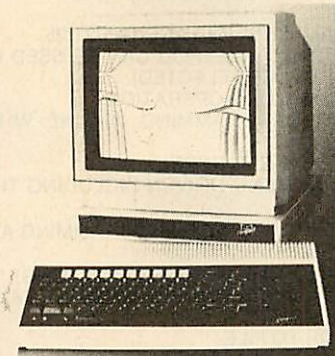
by Bruce Smith

Acorn's new computer, the £599 (plus VAT) BBC Master Compact was launched on September 1, ending the speculation about a new Baby Beeb computer. As its name implies, it's a cut-down version of the Master 128, rebundled to include a 3.5in disc drive running the Advanced Disc Filing System, and a colour RGB monitor at the top of the range.

The repackaging has seen the User Port, 1MHz expansion bus, cassette interface and second processor capability removed, though the Econet and serial interfaces remain, but require an upgrade to be fitted. The reshuffle includes a separate membrane keyboard and a disc box/power supply which also doubles as a monitor stand.

Two other versions of the machine are available - keyboard and disc drive only (£399+VAT) and with monochrome monitor (£469+VAT).

Acorn's philosophy is to aim



Compact: a cut-down Master

the Compact at the home environment with parents buying a computer that their children can 'grow' into. The educational bias is consolidated by the inclusion of the award-winning ABC wordprocessor and Logotron Logo packages.

The choice of the Advanced Disc Filing System (ADFS) working with 3.5in disc will raise a few eyebrows but the major software houses have worked with Acorn to make over 100 titles available on compilation discs at launch.

Olivetti will also be taking the Compact but under its own company colours, re-labelled Prodest. There will also be a nationwide chain of shops.

Such a movement should have huge financial benefits for the UK software market, which must have an excellent effect on the BBC/Master software market. Clares is a typical example with its *Artroom* already customised for the Olivetti Prodest and a firm order for 3000 packages. Olivetti has also expressed interest in *Fontwise* and a version of *BetaBase* has been agreed on.

Many will see the Master Compact as Acorn's reply to the successful Amstrad PCW computer - however this comparison should be avoided. As a word-processing system the PCW is still unsurpassed for price but has little other capability, while Acorn will further consolidate its position in the educational/home market.

● Turn to page 10 for details

## Econet's new features

Acorn has added powerful new features to the Econet network with the launch of Infosystem, including automatic log-on.

Once on the system the user can create information files which can be called up on screen by anyone on the network.

Electronic mail has also been made possible by setting up text files which are write-only to everyone except the owner.

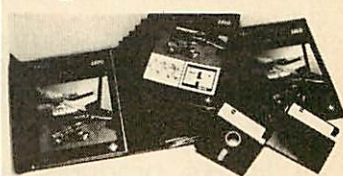
Finally, each user can create a

telephone and address book using a wordprocessor.

The price and availability has yet to be announced, but Acorn expects it to appear soon.

● Econet is the subject of a one-day conference at Bracknell on October 7. Speakers include teachers, SJ Research, Acorn, the BBC and *Acorn User's* own David Acton! Contact Ginnie Hume, ME Electronics, 5 Hatherley Road, Reading, Berks.

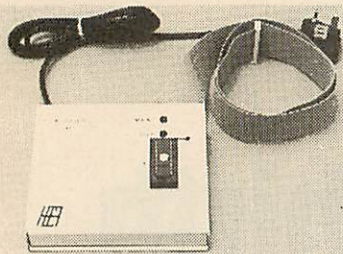
## Lego control kits



Lego has launched a range of kits to construct models of washing machines, traffic lights, conveyer belts, robot arms and X-Y plotters. A control program, *Lego Lines*, runs on the BBC micro. Contact Lego's Education Division at Ruthin Road, Wrexham, Clwyd LL13 7TQ.



## AT LAST AN EPROM PROGRAMMER POWERFUL ENOUGH TO MATCH THE MASTER.



The new MICRON 64K PLUS is now launched. NO OTHER EPROM PROGRAMMER can match the specifications yet it costs less than the competitors which offer far less. THE MICRON 64K PLUS runs on ANY VERSION of the BBC FITTED WITH A 1.2 OPERATING SYSTEM OR GREATER, VERY SIMPLE TO use with no switches to select. Two leds indicating power and programming are situated on the front panel. Plugs into 1MHz bus.

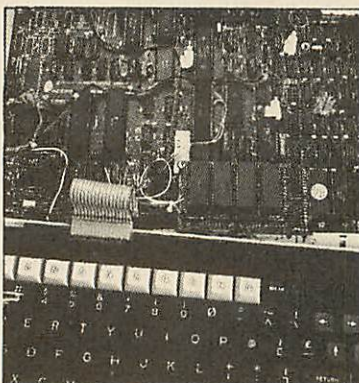
ATTRACTIVELY CASED IN CUSTOM BUILT SLOPING METAL BOX AND SPRAYED IN BBC MATCHING COLOURS.

### THE SPECIFICATIONS:

- \* FULLY MENU DRIVEN.
- \* WILL PROGRAMME 2716, 2732, 2764, 27128, 27256, 2532, 2564, 27512, 27513, 2516, IE MOST DEVICES 2K to 64K 2732A, 2764, ETC...
- \* PROGRAMS ALL EPROM'S 32K OR LESS IN A SINGLE PASS.
- \* FULLY BUFFERED
- \* SOFTWARE SELECTABLE PROGRAMMING VOLTAGE 12.5/21/25.
- \* NORMAL OR HIGH SPEED ALGORITHMIC METHOD CAN BE USED ON ALL EPROMS 8K, 16K, 32K, 64K (SOFTWARE SELECTED).
- \* ZIF SOCKET POWERED DOWN WHEN NOT IN OPERATION.
- \* VCC IS RAISED TO 6V DURING PROGRAMMING IN LINE WITH MANUFACTURERS RECOMMENDATIONS.
- \* MAINS DERIVED SELF CONTAINED POWER SUPPLY.
- \* SOFTWARE SUPPLIED ON EPROM IS MENU-DRIVEN INCLUDING THE FOLLOWING ROUTINES:
- \* AUTOMATIC VERIFICATION ON COMPLETION OF PROGRAMMING AND FAULT LISTING.
- \* BUILT IN FULL-SCREEN MEMORY EDITOR (BUFFER IS 32K LONG)
- \* SOFTWARE ALLOWS BLANK CHECK OF EPROM AND AUTOMATICALLY LISTS FAULTS.
- \* WILL COPY EPROMS TO BUFFER OR TO FILE.
- \* WILL GENERATE CHECKSUM.
- \* BBC FORMAT ROM IMAGES MAY BE CREATED USING A NUMBER OF BASIC OR MACHINE CODE PROGRAMS UP TO THE CAPACITY OF THE SELECTED ROM. MORE THAN ONE PROGRAM CAN BE STORED ON ONE EPROM.

PRICE ONLY £68.00 + £10.20 VAT + £3.00 P&P.

## THE 16/32K SIDEWAYS RAM CARD



A small, neat, no fuss board which hides neatly under the keyboard. This is available in either 16 or 32K versions. The 16K version is easy to upgrade to 32K. A write protect switch is fitted and software is available and can be addressed direct. Econet compatible.

Cost:

Complete with 16k of Sideways RAM £29.00 (VAT 4.35) Total £33.35  
Complete with 32k of Sideways RAM £35.00 (VAT 5.25) Total £40.25  
Upgrade from 16k to 32k £9.00 (VAT 1.35) Total £10.35

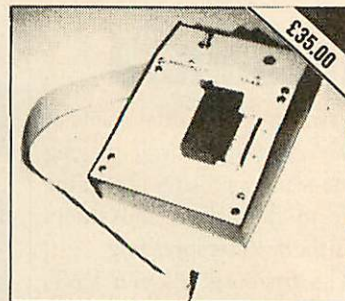
All HCR's products are designed and manufactured by the company and carry a full year's guarantee with full technical backup available.

ORDERS TO:

**H.C.R. ELECTRONICS,  
H.C.R. HOUSE, BAKERS LANE  
INGATESTONE ESSEX CM4 0BZ. Tel (0277) 355407/8**

## SPECIAL OFFER WHILST STOCKS LAST EPROM PROGRAMMER FOR THE BBC

A very high quality product direct from the manufacturers, contained in attractive sloping box with low insertion force socket and neon indicator for programming fitted as standard, the software adopts the high efficiency method for programming 2764 and 27128. This allows up to 100% faster programming, software in machine code, supplied on cassette and can be placed in eprom. Very easy to use, menu driven with easy to use instructions. This unit is completely self contained and plugs into the user port.



### THIS PROFESSIONAL UNIT ALLOWS:

1. Will program: 2716, 2732, 2532, 2764 and 27128 eeproms.
2. Copy eprom into memory and compute checksum.
3. Blank check eprom.
4. Program eprom from memory.
5. Verify byte by byte and compute checksum.
6. Allow buffer start area to be changed.
7. All operating system calls may be used when in menu mode.
8. Semi-intelligent programming. Typical time to program a 2764 8k device is approx. 50 sec. depending on the data to be programmed.
9. Additional software supplied to enable your own program (basic or machine code) to be put into eprom with the necessary leader information to allow calling with a \*command. Downshift routine to enable basic programs to be run is also supplied.

please add 15% VAT £1.00 post and packing

**ONLY £35**

ALSO AVAILABLE RAM/ROM CARD  
(Details on Request)

28 pin zif sockets suitable for plugging into ROM sockets £8.00 + VAT

AA95B

## THE EXTERNAL ROM/RAM UNIT

NOW INCORPORATING MORE FACILITIES THAN BEFORE AT NO EXTRA COST.

A very powerful system which allows total flexibility for the user with a capability of 24 ROM sockets plus 64k of Sideways RAM (not supplied) built in a sturdy metal case with hinged lid for easy access, and sprayed BBC Oatmeal colour. Much thought has gone into the design of this unit to incorporate as many features as possible.

### SOME ADVANTAGES:

- \* Allows up to 24 ROMS plus 64k of RAM or various combinations for the customer's requirements
- \* Easy to install. No Soldering. Takes no more than 15 mins
- \* Own power supply, no over heating
- \* Write protect switch fitted for RAM
- \* No access into BBC required after initial installation
- \* Does not physically interfere with other internal expansion add-ons
- \* Computer will still function with external unit unplugged (using ROM resident in BBC)
- \* Accessible for installing or removing ROMS

### NEW FEATURES

- \* Battery backup facility
- \* 32k of RAM on each card
- \* Read protect link

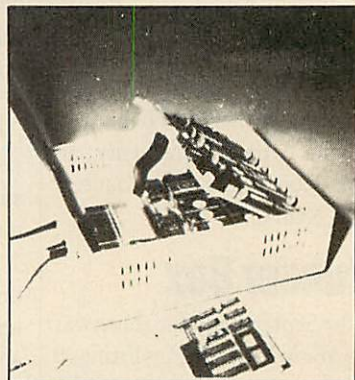
### The Unit

The case comes complete with an inbuilt power supply and one board capable of offering 12 Extra sockets plus the four in the BBC. 32k of Sideways RAM can be fitted to this board losing only 2 ROM sockets. A second board identical to the first can be fitted at a later date, giving a total capability of 28 sockets for ROM/RAM. Write protect toggle switch is fitted on the case and protects one or both boards. Read Protect Link again fitted to both boards. The installation of the unit is simple and should take no longer than 15 mins. The second card 1 min.

Cost:

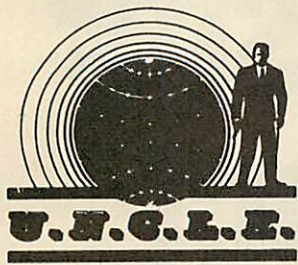
Unit complete 1 board  
Second board  
Post

£75.00 (VAT 11.25) Total £86.25  
£29.00 (VAT 4.35) Total £33.35  
£3.00





# THE MAN FROM



I'm in a black mood. This month will be devoted to wingeing of the most pathetic and utterly despicable kind.

The exhibition was as excellent as usual, but why is such a good exhibition housed in catacombs that would frighten the life out of any fireman? Imagine trying to clear the place quickly in the event of fire! It was hard enough to find the exit under no stress at all. And smoking is allowed! I'm a smoker (just until I finish this packet) but it seems absurd to allow anything which could increase the risk. There are enough electrical appliances and cardboard boxes at these events to put me in all the danger I can handle. Not only that, but it's unpleasant to shuffle round in those caves like some character out of *Knightlore*. More space, more light—I'm not a mole.

And another thing! Why is it always in London? What's wrong with the Midlands or even the dreaded north (and I don't mean Highbury)? We don't attack all strangers up here—just those who look like southerners. That's fair isn't it?

Right. Now for the disc drive manufacturers. I bought a single Mitsubishi drive in a double drive case having been assured by the nice man selling it, that it would easily accommodate my trusty Teac drive. So it did. Unfortunately, the data cable connections are on opposite sides and one (take your pick) is upside down. If it hadn't been for my pal Percy who understands these things and is a wizard of the wires I would have been in real trouble.

All the flaming switches are on the back as well. Told you I was in a black mood. Did I lie?

# Electron prominent at show

The 4th Official Acorn User Show went off with a big bang at the Barbican in July and, judging by the stream of people filing through the doors, was as popular as ever.

There were a number of exciting new releases at the show and some incredible bargains to be had—such as Twillstar's supply of Master 128 computers being sold at an unbelievable £399—a saving of £100 if you could get your hands on one!

The Electron was prominent (except on Acorn's stand!), with several companies showing new products. Advanced Computer Products had a number of bargains for the Elk, with a variety of Acornsoft titles, including languages, at under £10. Permanent Memory Systems launched its sub-£100 6502 second processor for the BBC micro and Electron—the latter gives a 300 per cent speed increase, and, for a small additional cost, includes Hi-Basic. Slogger's Advanced Electron ROM Box Plus and Turbo-driver for the Electron also captured interest.

Two leading software houses, Tynesoft and Superior Software, revealed new releases—*Commonwealth Games* and *Thrust*.



The 4th Acorn User Show: as popular as ever

On the Acorn stand most attention was directed to the two IBM-compatibles, the Master 512 and the Olivetti M19.

Commotion's stand was stacked with add-on goodies—the most notable was the new Scorpion controller system. Sharing the stand was Logotron whose Logo has been incorporated into the Master Compact.

Minerva Systems' excellent System Delta was on display with several new applications packages including video rental and mailing applications.

A team of Peartree dancing girls pulled the crowds to see Peartree's KBL computer system and business software, plus some

first-class graphics displays on large monitors.

Watford Electronics and Solidisk stands were packed as ever, as readers examined the huge range of wares on show. Wild Vision's image processing and computer graphics card captured the interest of many visitors, enabling scenes to be captured and then displayed.

And of course *Acorn User's* stand was well-represented with the new *Gallery Disc* selling out on the very first day. New releases included the *Assembler Extension ROM*, while readers thronged around the *AU* authors for advice, help and the occasional bit of praise!

# Seeing red about home control

by David Johnson-Davies

Control, seen as the ultimate application for a micro in the home, has always been thwarted by the practical difficulties of interfacing to domestic appliances, and the wiring involved. Now it seems that with Red Boxes, General Information Systems has come up with the answer.

Red Boxes are intelligent interfaces which enable a BBC micro to control ordinary electrical appliances, and to receive inputs from different types of sensor. They avoid the need for special

wiring by transmitting all the control information along domestic electrical mains cables. Data modulates a mains-borne 129 kHz radio frequency carrier, a frequency set aside by the British Standards Association for such applications.

The Red Boxes starter pack consists of three small units: Red One provides the electronically switched 13-amp socket into which you can plug any domestic appliance. Red Two is a wide-angle heat sensor, which can pick up radiation from a human body

at several feet; this is intended for applications such as intruder alarms and stair lights.

The third unit, Red Leader, is programmed using a BBC micro as a terminal. At the simplest level a command menu allows you to switch on appliances, set on and off times, or trigger them from an input on the Red Two sensor.

The Red Box starter pack costs £129 including VAT, and additional units cost £34.95 each including VAT. Contact GIS, Croxton Hall, Croxton Park, Croxton, Cambs.



# Acorn packs Master into £399 Compact

by Tony Quinn

After months of rumours and speculation, the Baby B, or the Master Compact 128 to give it its proper title, is here. And it looks very good indeed.

The machine will immediately raise comparisons with Acorn's own Electron and, of course, with Amstrad's computers.

First, what is the Compact? Acorn has taken the guts of the Master 128 which costs £499 (inc VAT) and cut out all the expensive, non-essential interfaces, which – although they give the BBC micro and Master great flexibility – are not necessary to most users in the home. The keyboard is now about half the size of the Master or BBC micro and a disc drive is fitted into a separate box with the power

supply. So for £399 you get the keyboard plus disc box which can be used with a TV set. For £70 more you get a monochrome monitor. For £599 you get a medium resolution (Philips) colour monitor. Note that prices exclude VAT – you can blame that on Amstrad's success.

The theory of all this is similar to that of the Electron. However, the Electron not only lost all the interfacing, but also the software compatibility and speed. And it never came out on time. The Compact appears to have hit on a good compromise – the power of the Master but equivalent to £250 cheaper. It has all the interfaces needed in the home and by small businesses, all the software compatibility (apart from the disc medium), and

## Master Compact 128

£399 plus VAT (includes single 3.5in disc drive)

## Compact plus monitor

£469 plus VAT (as above, but with monochrome monitor)

## Compact plus colour monitor

£599 plus VAT

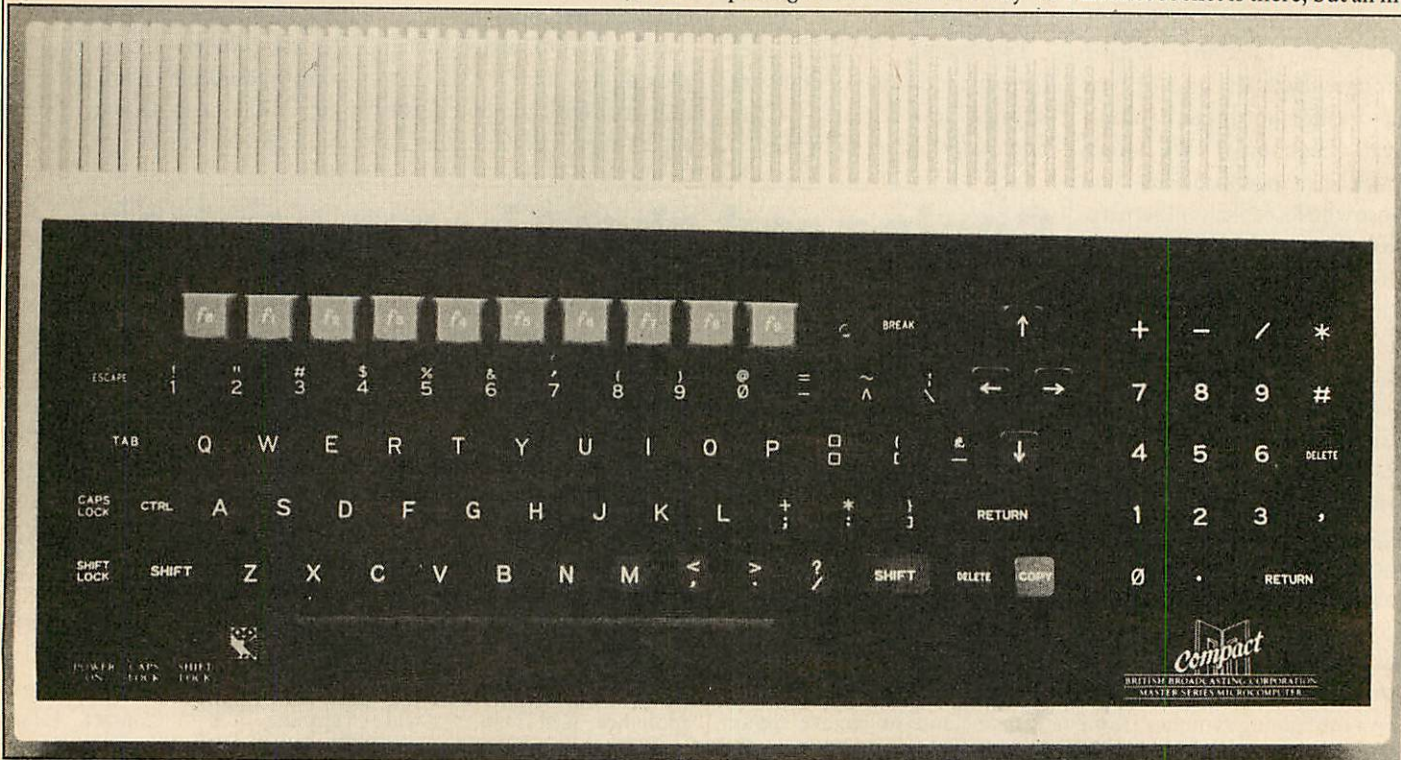
Each includes View, Logo and ABC software.

Acorn appears to have set up stockpiles for the launch. As long as Acorn gets the advertising and distribution right there should be no problem selling it.

And what about the Amstrad? The Compact doesn't come with a printer, but then it's more than a wordprocessor. It comes with the View wordprocessor built in, but it also has Logo for teaching and a children's writing package. And that's the key to

Acorn's strategy, to sell it to parents who want to teach their children about computers. The Amstrads can't do that.

What are the disadvantages? First, it comes with 3.5in disc drives. These are the coming thing, but there isn't much software around on them yet – although Acorn has persuaded companies to back the machine with 100 titles available from the launch. Next, it doesn't have a user port, 1MHz bus, analogue port or RS232 fitted. But don't despair, the analogue port and user port have been chopped down to become a joystick/mouse interface, with an 'Atari-type' connector. And the RS232 can be added (it's just four extra chips) to take a modem. An Econet socket is there, but an in-



A 'Baby'-sized keyboard for the Master Compact 128 – it's about half the size of that of the Master or BBC micro





**The Master Compact: top of the range model with colour monitor plus disc drive**

terface must be plugged in as on the Master. The sockets are fitted, but blanked off. If you want a proper 1MHz bus/user/analogue port, then you'll have to purchase a Master.

Also, the Compact doesn't have sockets for either internal co-processors or external second processors. This means it can't be upgraded to the power of the Master Turbo or the 512 with its IBM compatibility.

The Compact will give the whole BBC market a much-needed boost, if only because it should get BBC software and hardware back into the major re-

tailers and put the name in front of the computer industry. It might well help the Electron particularly as 3.5in drives were used in the Electron Plus 3 disc drive add-on.

One of the most fascinating things about the Compact is going to happen in Italy.

Olivetti is to launch the machine in Italy as one of its own called the Prodest. Italy is some way behind the UK in micro penetration (they're mostly Commodores apparently) so with Olivetti behind it, the machine should do great things for Acorn's bank balance. Could

Olivetti sell more than Acorn? It will be interesting to see the results.

The machines will be built in England by Rank Xerox in Hertfordshire initially.

Acorn's target is the home market. Not a strict games market, but following on Acorn's success in education, while putting the Amstrad side of business into the nation's front room as well. The BBC micro sold, but the Master was too expensive. This is Acorn's way of putting that right.

**Bruce Smith takes the lid off the Compact - page 15**

## Discs tie-in with launch

Over a hundred software titles were set for distribution on 3.5in disc format for the Compact launch. Acornsoft and Superior have jointly launched ten games, with more to come.

Some of the other publishers fired up for the launch include BBC Soft, Tynesoft, Micro Power, Kosmos, 4Mation, Fernleaf, Medstat, AMS, Clares and Computer Concepts.

Details from Dept 3P, Acorn, 645 Newmarket Road, Cambridge CB5 8PD.



# The new BBC micro allows your child a bit of growing room.

Ample room to accommodate your child's learning development.

The BBC Master Compact's educational software, takes children from their first grasp of words and numbers to A-level and beyond.

In 84% of U.K. schools, children are already growing up with BBC micros.

With a BBC Master Compact at home, your child's ability with computers will progress by leaps and bounds.

Before too long, you may find that you have a Businessman of the Year in the family. At which stage, our micro could well be handling your young tycoon's financial planning and forecasting.

Accountancy Age has already acclaimed our spreadsheet package as 'the most sophisticated yet produced for a small micro'.

The BBC Master Compact manages to fit the BBC micro's benefits into one, easy to use package. This includes colour monitor, processor, disc drive and enough software to keep you and your children busy indefinitely.

It is now available from main computer dealers.

You owe it to yourself to buy them something they won't grow out of easily.

AVAILABLE FROM SELECTED BRANCHES OF CURRY'S, DIXONS, JOHN LEWIS, LASKYS, W.H. SMITH AND YOUR ACORN DEALER.  
THE MASTER COMPACT 128K RAM, 3.5" DISC DRIVE, PRINTER AND JOYSTICK INTERFACE. SOFTWARE INCLUDES VIEW WORD PROCESSOR, ABC, CARD INDEX, LOGOTRON LOGO, WINDOW DRIVEN DESK TOP SYSTEM, ADVANCED DISC FILING SYSTEM, 14 PROGRAM WELCOME PACK AND 4 TUTORIALS, SPREADSHEET EXTRA AT £52. BASIC PRICE £399. WITH MONOCHROME MONITOR £469. WITH HIGH RESOLUTION (0.42 PITCH) COLOUR MONITOR (AS ABOVE) £599. ALL PRICES PLUS VAT. FULL DETAILS FROM BOB COATES, DEPT (AU1), ACORN COMPUTERS LTD., CAMBRIDGE TECHNOPARK, 645 NEWMARKET ROAD, CAMBRIDGE CB5 8PD.

**Compact**  
BRITISH BROADCASTING CORPORATION  
MASTER SERIES MICROCOMPUTER

## The BBC Master Compact.





Equips your child for life.

**Acorn**   
The choice of experience.



## NEW PRODUCTS

**ADVANCED PRINT BUFFER** is a program that runs in sideways RAM and provides a large printer buffer, instead of the resident 63 bytes. Large means over 14K (14 700 characters) allowing letters, reports, documents, listings etc. to be printed while you carry on with another task. Full control is provided to switch buffer on/off, purge buffer, even changing the effect <ESCAPE> has on the buffer (essential when using w/prox such as View) (5¼ ADFS) /B/M/ C £5.95

**ADVANCED ELITE FS** allows Master users to run their BBC Elite program disk on the Master or Master Compact (5¼ ADFS) /M/C £5.95

**ADVANCED BBC DFS E00** enables B+ or upgraded B users to run 1770 DFS at @ E00 when used in 16K sideways RAM (5¼ ADFS) /B+ £5.95

# Advanced Computer Products

The following ACP products:  
Advanced Disc Toolkit  
Advanced Disc Investigator  
Advanced ROM Manager  
Advanced 1770 DFS  
are all  compatible

## ADVANCED DISC TOOLKIT

(01) /M/B/E £34.50

Any Acorn user including Master, BBC B+, Electron, DFS, 1770 DFS, ADFS, 2nd. & co-processors A.C.P.'s BEST SELLING product containing over 30 commands inc.: powerful memory & disc editor, search memory/disc/basic, catalogue/unplug ROMS, load/run programs below page, automatic menu, file transfer (inc. locked cassette files), ADFS utils etc. etc. ("it's superb" ... Database Pubs. - "excellent value for money" ... Acorn User) (16K EPROM & FULL MANUAL)

## ADVANCED ROM ADAPTOR 2

(03) /M/E+1/ £14.95

An Acorn approved cartridge containing a card with special 'zero' profile sockets that allow you to fit compatible 8K or 16K EPROMS/ROMS. The cartridge is fully enclosed providing complete protection for your ROMS. Simple to use -no switching-complies fully to the Acorn (sideways) Rom Filing System. A.R.A.2 contains 2 sockets.... A single adaptor is also available.... A.R.A.1 (02) /E/ £10.35

## ADVANCED SIDEWAYS RAM

(04) /E+1/ £29.90

A highly versatile but simple to use s/w RAM cartridge that is automatically write protected on loading. Contains 16K RAM but can be switched (externally) to 2 X 8K RAM. Supplied with instructions & full software support (on cassette) to save ROM images to disc/tape, load RAM from file, Advanced Print Buffer & MakeRom a utility to merge several files from disc to be run from the ROM FS. (S/Ware on disc: please add ... £1 5¼ DFS .. £2 3½ ADFS)

## ADVANCED ELECTRON DFS

(05) /E/ £24.15

Electron & Plus 3 users ... gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based software. A.C.P. also supplies 5¼" disc drives to add to your Plus 3 (inc. 2nd. drive adaptor). "ACP has produced another superb ROM for the Electron" ... Electron User Feb '86 (supplied on 16K EPROM + DFS MANUAL)

## ADVANCED DISC INVESTIGATOR

(06) /M/B/E/ £28.75

A very powerful Disc utility for standard & non-standard discs. Backup most protected discs, edit any type of non-standard disc, check & repair faulty tracks, create new disc formats, copy 40track discs to 80track discs, verify two non-standard discs. ("ADI features an extremely comprehensive sector editor, and one of the finest I've seen" ... Tubelink on Prestel) (supplied on 16K EPROM + manual)

## ADVANCED ROM MANAGER

(07) /M/B/E/ \*£14.95\*

A friendly utility for ROM & sideways RAM. Examine ROM/RAMs, load files into RAM, move memory to/from Sways ROM/RAM, catalogue/kill ROMS, offer commands to specific ROMS, save ROMs to disc/tape, AUTOROM a file (inc. BASIC) to run from Sways ROM/RAM, execute specific machine code subroutine in a ROM, generate a ROM's checksum & CRC. \*ON ALL ORDERS RECEIVED AFTER 29TH AUGUST\* (supplied on EPROM + manual)

## ADVANCED PLUS 4

(08) /E+1/ £79.98

"DISC DRIVE COMPATIBILITY AT LONG LAST" ... (Electron User June '86) this sums up AP4 & ACP's approach to producing products. AP4 is a fully ACORN compatible disc I/face & will accept any standard drive inc. PSU, runs 1770 DFS (as fitted in the B+ & Master), keeps page & E00, utils in ROM & provides a spare rom socket. "ACP's PLUS 4 comes out on top. I can recommend it to anyone..." (E.U. June '86) ...AP4 should be considered the standard interface for the Electron (AU July '86)

AP4 100 £198.97 (inc VAT & delivery)  
AP4 400 £228.98 (inc VAT & delivery)

## ADVANCED PLUS 5

(09) /E+1/ £66.70

A triple interface cartridge providing...  
1) a TUBE i/face allowing a second processor to be connected, increasing BOTH speed & memory (PAGE & 800 HIMEM & 8000 in all modes)  
2) a 1 MHz BUS for control applications & prommers  
3) the USER PORT for mouse and graphic devices.  
Also contains 2/3 ROM sockets and on board operating software for 2nd processor.

## ADVANCED 1770 DFS

3 versions ADM (11) - ADB (12) ADE (13) £34.50

ACP have totally re-written the Acorn 1770 DFS, enhancing existing features & adding new ones. The result is probably the fastest & most powerful disc filing system your computer could have. With the ability to operate in double density occupying both sides of a disc (640K). Automatic file relocation, improved file handling, 62 file catalogue and Sways RAM can be used as a fast RAM DISC. (16K EPROM + comprehensive manual)

## ADVANCED ELECTRON DFS E00

(14) /E+ASR/ £19.99

An alternative to our AED(05) for Plus 3 and ASR users. This optional alternative DFS is designed for use in Sideways RAM (ASR) and allows the user to operate a disc filing system & E00 when using the Plus 3 (in ADFS page would normally be 1D00). The DFS is simply loaded using the software supplied with the ASR from disc. (optional upgrade for existing AED users £9.50 on return of original EPROM) (3½" ADFS disc + manual)

## \*OTHER PRODUCTS & SPECIAL OFFERS\*

VIEW cartridge (101) /E+1/	£15.00	3½" discs in 1/box(120) /M/B/E/	£24.00
Vsheet " (102) /E+1/	£15.00	5¼" discs ds/dd "(121) /M/B/E/	£12.99
VIEW & VSHEET (119) /E+1/	£25.00	5¼" discs ss/sd (122) /M/B/E/	£ 8.99
LISP cartridge (103) /E+1/	£ 9.99	3½" disc drives (please call for price)	
E/Adv User Guide(104) /E/	£ 4.95	5¼" disc drives (please call for price)	
TURTLEgrhpCASS(105) /E/	£ 3.99	2nd. Drive Adaptor(130) /E+3/	£ 7.95
LOGO cartridge (106) /E/	£44.95	3½" library box10 (124)	£ 2.95
PASCAL cartridge(107) /E/	£44.95	16K EPROMS (131)	£ 3.75
VIEW pack BBC (118) /B/	£49.00	VIEWSTORE (117) /M/B/(e)	£57.95
AP4 100 (140) /E+1/	£198.97	AP4 400 (141) /E+1	£228.98

Equipment codes /M/= Master /B/=BBC /E/=Electron /E+1/=Electron+Plus1 /C/=Compact

Please send order to:-  
Advanced Computer Products Ltd.  
6 Ava House, High Street,  
CHOBHAM, Surrey, England  
GU24 8LZ. Tel. 0276 76545  
(mail order only)



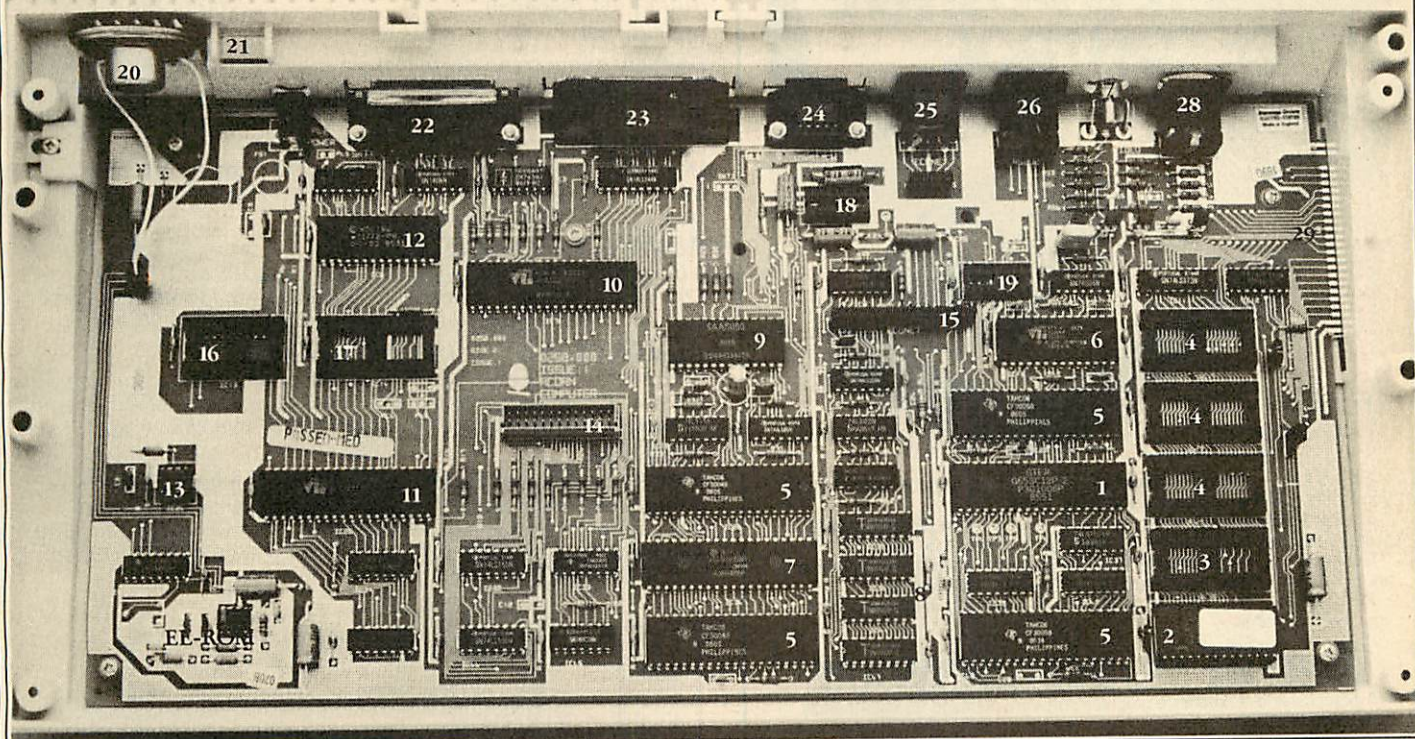
(in event of any query -  
please include your tel. no.)

NAME .....  
ADDRESS .....  
POSTCODE .....  
TEL. ....

CREDIT CARD No. ....

I enclose payment for £.....  
Exp date ..... (A17)





## Hardware key

- 1 65SC12 micro processor
- 2 MOS - 64k
- 3 32k ROM socket
- 4 16k ROM sockets (\*3)
- 5 Customised gate array chips (\*4)
- 6 Video processor
- 7 6845 Cathode Ray Tube Controller
- 8 128k RAM (4\*32k chips)
- 9 Teletext chip
- 10 User 6522 VIA
- 11 System 6522 VIA
- 12 1772 Disc Controller Chip
- 13 EE-ROM
- 14 Keyboard connector
- 15 Econet board connector (\*2)
- 16 Serial Uart (upgrade chip)
- 17 Serial upgrade chip
- 18 RS232 driver/receiver chip (serial upgrade)
- 19 Serial upgrade chip
- 20 Speaker
- 21 5V power supply input
- 22 Disc connector
- 23 Printer connector
- 24 Joystick port
- 25 Econet socket
- 26 RS232 socket
- 27 Video output
- 28 RGB socket
- 29 Expansion connector

# Taking the lid off the Master Compact

by Bruce Smith

The Master Compact is supplied in two boxes (three if you've ordered a monitor) which are connected together as follows:

- Keyboard and main printed circuit board containing micro-processor, ROM, RAM, specialist chips and sockets and ports.
- Disc drive - a 3.5in drive running under ADFS and connected to the keyboard by a length of ribbon cable. The box also contains the Compact's power supply unit with mains switch on rear. A single 3-pin plug supplies mains power and avoids the 'spaghetti' of leads that most of us have been brought up to believe is a must for any good computer system! Acorn anticipates offering a second disc drive as an upgrade. No price is available at present but it will probably be over £100.

- The disc box also acts as a

monitor standard for either a TV, a monochrome or RGB monitor.

- Monochrome monitor (£469) or RGB monitor with sound output (£499).

## The keyboard

For the Compact, Acorn has dispensed with the traditional BBC computer keyboard with switches underneath the keys and gone for a rubber-plastic moulding membrane. This is not quite as awful as it sounds - in fact I personally prefer it for feel to the keyboard supplied with the Master 128 - though both are far inferior to the old BBC micro keyboard. The key layout is as for the Master 128, including numeric keypad.

The keyboard is housed in a rather tasteful case which is not dissimilar to that used for the Communicator. Directly under-

neath the keyboard is the main printed circuit board (PCB) housing all the computer's circuitry (see above).

## The main board

Although essentially a cut-down Master 128, the main printed circuit board of the Master Compact has been completely redesigned. The chip count has been kept down to just 41 and the board is spacious.

The processor is a 65SC12 - the same as on a standard Master 128. 128k RAM is permanently supplied, arranged as 64k main RAM and 64k sideways RAM. A notable difference is that this sideways RAM is permanently available and cannot be masked out with extra ROM slots by setting links as on a standard Master 128.

A 50-way expansion connector protrudes from the right-



## DIGIMOUSE™ ACCURATE & POSITIVE MOUSE CONTROL



For BBC B,B+  
or Master

DIGIMOUSE is especially designed to fit comfortably in the hand to give you a truly positive and stable movement control.

This quality British Mouse has a non-slip polyurethane ball and encoder system, precision engineered to give you lasting accuracy.

Connects to the user port and is compatible with many existing graphic art and word processing packages including AMX and Wigmore.

Price includes machine code routines to help you add mouse control to your own programs.

## Grafik MOUSE SOFTWARE

A practical and inexpensive graphics software package for user-friendly introduction to CAD.

Input is by DIGIMOUSE and FUNCTION KEYS for the most efficient and accurate production of complex designs.

Some of the many features are:

Rubber Banding on all drawing options • Colour and fill • Adjustable brush size • Text insertion • Alignment grid • Mode selection • Printer dump • Large drawing area • Save and load to disk

GRAFIK is supplied with user routines on disk in 40T or 80T format plus a comprehensive operating guide and demonstration.

DIGIMOUSE with GRAFIK complete **£49.90** incl. VAT  
BBC DIGIMOUSE with user routines only **£34.95** incl. VAT



## PROGRAM SPEED CONTROLLER



### A UNIQUE COMPUTER TEACHING AID FOR BBC B,B+ OR MASTER

**SLOW MOTION** — enables the teacher to set the speed of the program to individual pupil's ability.  
Infinitely variable speed control for games and teaching programs without the need for special software.  
Simply press for 'on', adjust speed, press for 'off'.

**FREEZE FRAME** — allows programs to be interrupted and halted at any point for discussion purposes or special emphasis.  
Press to 'Freeze', release to return to previously set speed.

**SLOMO WITH CABLE  
AND CONNECTOR FOR  
FITTING DIRECTLY TO  
THE BBC TUBE PORT**  
**£14.95** incl. VAT

PARTICULARLY SUITABLE FOR YOUNGER CHILDREN  
OR THOSE WITH SPECIAL NEEDS

Fully guaranteed, high quality British products

#### ORDERING INFORMATION

All prices include VAT, post and packing. Please send cheque, PO or Access details to the Department address shown below. We accept official orders from UK Government and educational establishments. Allow 14 days delivery. If you require more information or advice telephone Harrogate (0423) 864488.

**NIDD VALLEY MICRO PRODUCTS LTD**

Dept. AU 1086 FREEPOST, KNARESBOROUGH, N.YORKS. HG5 8YZ.  
Telephone: Harrogate 0423-864488

Try these exciting packages  
carefully selected by Pillarbox

### THRUST

The game of the moment. Micro User gave it 10/10 "Overall". Take part in a mission to visit 24 Planets. Disc £9.95 (RRP£11.95). Tape £6.45 (RRP£7.95). (Superior).

### SPEECH!

Don't open your computer to make it speak! Run SPEECH! and HEAR keyboard entries, text, or W/P files. Use SPEECH! in your own programs. 40/80T Disc £9.95 (RRP£11.95). Tape £7.95 (RRP£9.95). (Superior).

### STUDIO 8

Make your computer sing. Create music on 8 tracks. Easy and amazing. Excellent demos provided. 40/80T Disc £17.50 (RRP£22.00). Tape £14.00 (RRP£17.00). (BEEBUG).

### ADVANCED DISC TOOL KIT

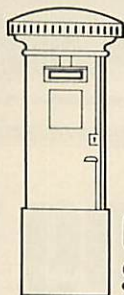
A Classic. 30 new commands for ALL Acorn (DFS & ADFS) disc users e.g. Automatic Menu. Various file transfers (even locked cassettes). Disc and memory editor. etc. Eprom. £30.25 (RRP £34.50). (ACP).

### ADVANCED DISC INVESTIGATOR

"...the best product of its type I have ever seen" (A&B Computing). The latest ACP release for the more technically minded. Includes Backup for most protected discs. Eprom £24.75 (RRP£28.75). (ACP).

### INFORM

A MUST for Sideways RAM owners. Information from S/ways RAM displayed instantly without disrupting the current task, e.g. word-processing. Ingenious and Simple. Compatible with ATPL Sidewise with RAM, Solidisk SWR, BBC B+128, MASTER, ETC. 40/80T Disc £16.50 (RRP£20.00). (CJE).



**Pillarbox  
Software**

All our software is BBC B/B+/Master compatible.

PRICES INCLUDE VAT, POSTAGE, AND PACKING.  
Overseas orders please add £1 per order.

Send your requirements on a piece of paper stating:  
Program required Disc/Tape/Eprom Type of Computer  
Your Name and Address (& Telephone Number in case of queries)

Enclose a cheque/postal order to  
"PILLARBOX SOFTWARE" and send it to:

PILLARBOX SOFTWARE  
11 RAVENSCROFT PARK  
BARNET  
HERTS EN5 4ND.

## Disc Conversions

Why pay £10.00 or more for every disc converted, when you can use our program DISCOPY with your BBC micro to read and write a wide range of discs, including MS-DOS, CP/M, Torch, and Atari as well as BBC DFS and ADFS?

You must have a BBC B plus OR a BBC Master 128 OR a BBC model B with a 1770 upgrade.

With a suitable disc drive (3 inch for Amstrad, 3.5 inch for Apricot, Atari ST, 5.25 for most others - 80 track drives give greatest flexibility, but 40 track drives can be used effectively) you can read and write a range of formats, including:

- 5.25" discs: IBM PC and compatibles (160k, 180k, 320k, 360k, 720k)  
Osborne, Superbrain, Torch, Kaypro, Comart, Cifer, RML 380Z
- 3.5" discs: Apricot (315k, 720k), RML Nimbus (720k), Atari ST (360k, 720k)  
Epson PX8, Data General
- 3.0" discs: Amstrad single and double sided

Our program DISCOPY is menu-driven and has full facilities for disc management, viz:

<b>COPY files</b>	<b>FORMAT disc</b>
<b>DIRECTORY of disc</b>	<b>HEX dump of file(s)</b>
<b>ERASE file(s)</b>	<b>TYPE file(s)</b>
<b>RENAME file(s)</b>	

Access is also allowed within the program to BBC \* commands.

#### DISCOPY Inclusive Prices

Module 1	BBC ↔ MS-DOS	£19.50	Module 2	Torch ↔ MS-DOS	£12.50
Module 3	CP/M ↔ MS-DOS	£19.50	All 3 Modules		£39.50

State disc size (5.25", 3.5"), number of tracks (40,80), and type of 1770 upgrade.

BAKsoft 20 Leys Avenue Cambridge CB4 2AW



hand side of the keyboard case. The edge connector is similar in terms of pin order and signals to cartridge socket 3 on a Master 128. Thus it is theoretically possible to add external sideways ROM or RAM expansion. Paged ROMs would be mapped as sockets 0 and 1.

Many of the standard Master CMOS gate array chips are in place, including the memory controller, the cathode ray tube controller multiplexer, the memory controller and peripheral bus controller.

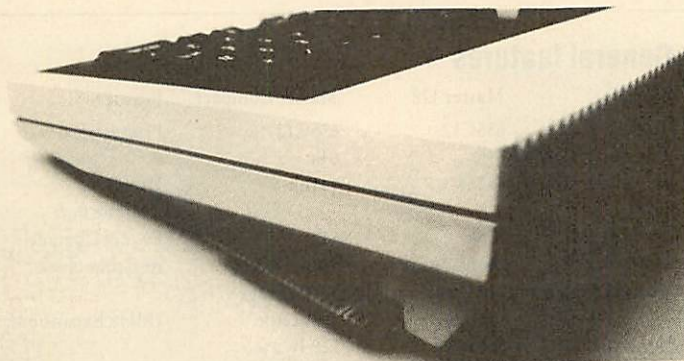
The right-hand side of the board is flanked by five sockets, the bottom of which is the 64k ROM containing the Compact's firmware. This socket does have a 128k capability selectable via a standard link. ROM slots &9 to &F appear in the 64k ROM, though ROM slots &D and &F are mirrored in &9 and &B unless 128k ROM is fitted.

These four sockets are free for ROMs and EPROMs, the upper three being 16k capacity and the fourth 32k. These appear as ROM slots 0/1, 2, 3 and 8. Sideways RAM appears in slots 4 to 7. Slot &C is not used.

There is no real-time battery backed clock with the Compact. Status and configuration bytes are implemented however, by the use of an EE-PROM chip. This small device contains 128 bytes which are written to and erased electronically.

Disc control is provided by the 1772 chip – this is a slightly faster version of the 1770 chip which Acorn supplies with the Master 128 (though later machines are fitted with a 1772).

The rear of the board houses all the standard ports for the



**Note the 50-way expansion connector protruding from the Compact**

Compact for use with printers, disc drive etc. The ports are non-standard compared to previous BBC machines – however this is not a ruse on Acorn's behalf but intelligent foresight to allow the Compact to comply with possible new radio frequency interference requirements.

No hardware provision is made to support either a cassette interface or a TV UHF output, though an external colour matrix/modulator can be attached to the video socket.

There is no hardware support for the standard Master analogue port, however a digital (Atari-style) joystick may be connected via the joystick port on the rear of the case. The MOS firmware converts the joystick output into suitable ADVALs to allow emulation of a standard BBC micro joystick operation.

The serial port is an optional extra. Upgrade to the RS232 port is performed simply by the insertion of four chips and pushing out the rear socket cover to expose the serial port socket. No hardware provision of any kind is made to support a modem upgrade.

A standard Centronics printer can be attached via a 24-way Delta socket – printer leads are

therefore not directly interchangeable between BBC Master and Compact, though small adapting leads can be fabricated if desired.

Provision is also made for the installation of an Econet board internally – fitting to the rear right of the main PCB – and insertion of the ANFS ROM.

Second or co-processor expansion is not possible, nor is access to the 1MHz bus hardware and software support is removed from the Compact. As is evident from the photograph below, there is no provision for a User Port though some lines for the User 6522 VIA are present on the joystick port including the light pen strobe input (LPSTB) line.

## The 64k ROM

The 64k ROM contains a 32k machine operating system (MOS version 5), Basic 4(1986) and version 2.0 of the Advanced Disc Filing System (ADFS). Typing \*ROMS shows that these are ROMs F, E and D which show up as UTILS, Basic and ADFS on the ROM list.

The Master 128 MOS has had to be pruned down from 35k to allow it to fit into the 32k available. This has been done by cut-

ting out code responsible for handling of input/output (I/O), Tube, and other hardware now not present. Sideways RAM commands such as \*SRLOAD, \*SRWRITE, etc, which previously lived in the DFS ROM have been re-housed in the new slim-line MOS.

ADFS version 2.0 is the same as earlier releases with the addition of format, verify and back-up commands now in ROM. To allow for this, the Winchester handling code has had to be removed – but as the Compact has no 1MHz bus, a Winchester hard disc cannot be accommodated anyway.

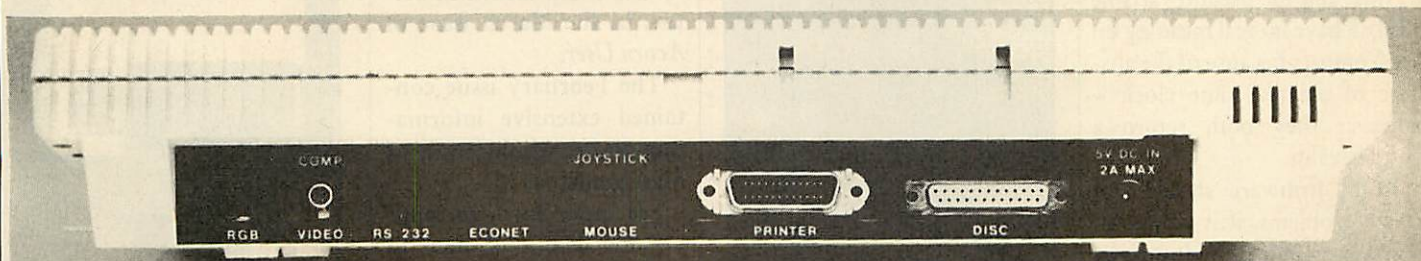
Basic 4 is virtually the same as supplied on the Master, except that the mathematical functions have been re-coded to give in excess of a 30 per cent speed increase. It is called Basic 4(1986).

## View/Logo/ABC

Acornsoft's *View* word-processor and Logotron's *Logo* are supplied on the 'Welcome' disc in the form of ROM images which can be loaded into a bank of sideways RAM and used as normal. *View* is version 3.2 and is supplied with its own printer driver which is installed automatically.

The choice of Logotron *Logo* in preference to Acornsoft's own *Logo* may raise a few eyebrows. However, remember that the Acornsoft *Logo* is geared very largely to driving turtles which is beyond the capability of the Compact.

The award-winning child's wordprocessor *ABC* is also supplied, along with a program which will convert *ABC* text files into *View* format.



**The ports are not of the BBC series standard – they have been adapted to comply with possible future radio frequency requirements**



## The Welcome disc

Acorn provides a very nice front end to the Compact. This is supplied as icon-driven software on the 'Welcome' disc. When the 'Welcome' disc is run you find yourself in a desktop environment from which you can move a pointer to select applications software, games, tutorials, utilities or graphic displays. Selections are made by moving a pointer to the named box and pressing the Return key which reveals a pull-down menu from which a final selection may be made. Applications include a card index file, a calculator, a 16-page note pad and clock display.

Many of the other programs on the 'Welcome' disc will be familiar to Master owners as these include the Control Panel which allows setting of configuration bytes which define start up options, plus other favourites like the pattern and envelope editor.

## Compatibility

Acorn has put a lot of effort in behind the scenes to ensure software compatibility, with over 100 software titles available for the launch of the Master Compact. In general probably the biggest barrier for anybody wishing to port their own software across is the limitation to 3.5in discs and the use of ADFS. However, any item of software working on the Master 128 that does not take advantage of the peripheral hardware should work first time on the Compact.

The absence of sections of MOS coding should not cause any errors with Osbyte calls returning values to the effect of not being present. The command \*TIME and the pseudo variable TIMES have no real meaning on the Compact because of the absence of the real time clock - however they both return a dummy value.

ROM firmware should not create problems, if it works on the Master 128 it should work on a Master Compact.

## General features

Feature	Master 128	Master Compact	Feature	Master 128	Master Compact
CPU	65SC12	65SC12	Printer port	Centronics	Centronics
Fitted user RAM	64k	64k	26-way IDC	24-way delta	
Fitted sideways RAM	4*16k	4*16k	User Port	101/O bits	71/O bits
Fitted ROM	128k	64k	Cassette Port	CUTS relay	No
ROM sockets	1*16k, 2*32k	3*16k, 1*32k	Econet Upgrade	Module, ANFS	Module, ANFS
Memory expansion	2*44-way cartridge sockets	50-way edge connector	Real time clock	Time, calendar and battery	No
Non-volatile memory	50-bytes CMOS	128-bytes EE-ROM	1MHz Expansion	Cartridge and 34-way expansion bus	PCB Edge connector (at 2MHz)
Screen modes	0-7+shadow modes	0-7+shadow	Tube expansion	Module/40-way IDC	No
RGB output	Yes	Yes	Sound output	4 channel 8R speaker	4 channel 16 speaker
Composite video	Yes	Yes	Firmware in ROM	MOS 3.2, Basic 4, ADFS, DFS, View, ViewSheet	MOS 5.0, Basic 4, ADFS
TV UHF	Yes	No	Firmware on disc	None	View, Logo ABC, Welcome disc, Desktop
Analogue Port	4 Channel A/D	No	Software	Welcome disc	
Disc interface	Shugart 34-way IDC	Shugart 25-way D			
Serial port	RS 423	RS 232			

## ROM socket equivalents

Master Compact	Maximum size	Slot number	Master 128
IC38	32k	0,1	Cartridge (sk3)
IC23	16k	2	Cartridge (sk4)
IC17	16k	3	Cartridge (sk4)
IC29	16k	8	IC27

## Master joystick pinout

6522 User VIA names	Master Compact pin	Master 128 User Port
CB1	5	2
CB2	9 (LPSTB)	4
PB0	6	6
PB1	3	8
PB2	2	10
PB3	1	12
PB4	4	14
PB5	(Expansion bus, 22a)	16
PB6	(Expansion bus, 21a)	18
PB7	(Expansion bus, 20a)	20
0V	8	5-19 odd numbers
5V	7	1, 3

This table allows you to compare the features of the Master Compact with those of the Master 128



## Master

Full details of the Master 128, on which the Compact is based, were carried in an in-depth review by Bruce Smith, AU's technical editor, in the March issue of *Acorn User*.

The February issue contained extensive information on the whole family of Master micros.

See order form on page 129 for details of how to order back issues.





Without music, graphics  
and sound the Board  
Game has become the  
most popular in the  
world.  
Now it has them.



"Over 3,000 questions of no vital importance."



HORN ABBOT  
INTERNATIONAL  
©1983 HORN ABBOT INTERNATIONAL

Available now on  
Spectrum 48/128K Commodore 64/128K  
BBC 'B' Amstrad CPC  
Cassette and Disk



John Menzies

and all local stockists

TRIVIAL PURSUIT is a Trade Mark owned and licensed by Horn Abbot International Ltd.  
Published by Domark Limited, 204 Worple Road, London SW20 8PN. Tel: 01-947 5624.  
Trivial Pursuit was programmed by Oxford Digital Enterprises.



DOMARK





# THE ULTIMATE RANGE

Because there's a vast number of applications for the BBC master computer, it stands to reason that there ought to be an equally large number of memory devices to deal with every requirement.

Nobody knows this better than Akhter; we've been serving the market for nearly a decade, that's why we've developed our UFD range with just about the most comprehensive selection of BBC compatible memory devices available.

We've got 40 and 80 track 3½" and 5¼" single and dual disk drives available with or without power supply. There's also a 3½" and 5¼" combined drive so that you can transfer software from one format to another.

If it's Winchesters you are after you needn't look any further, we've got a range of drives up to 40MByte with standard controller card and ADFS ROM. The choice doesn't stop there because we've also developed units that include our own 10MByte tape streamer.

Today there is the need to combine several memory devices, for data storage, in a single unit – the fact that they can be used as a monitor stand is an added advantage. Akhter has developed a range of these combinational units that provide neat and simple solutions to perennial problems.

So now you can plug in a Nucleus 20 which combines a 20MByte Winchester, 10MByte tape streamer and 1MByte floppy drive, or if you prefer there is the Archive which incorporates a 1MByte disk drive with a 10MByte tape streamer. So whatever your requirements you'll find a unit in the UFD range that's right for you.

All Akhter products come in colour matched BBC beige and are supplied 100% function tested, complete with user manual and connection cables. If you would like any further information contact your local dealer or telephone Akhter on (0279) 443521.





# OF MEMORY DEVICES

MODEL	DESCRIPTION	PRICE	MODEL	DESCRIPTION	PRICE
MD400A	SINGLE 400K 40/80 T DS DD	£129.95	MD802F	DUAL 800K 80T 3.5" DS	£199.95
MD200A	SINGLE 200K 40T DS	£109.95	MD400E	SINGLE 400K 80T 3.5" DS PSU	£139.95
MD200B	SINGLE 200K 40T DS PSU	£129.95	MD802G	DUAL 800K 80T 3.5" DS PSU	£225.95
MD400B	SINGLE 400K 40/80 T DS PSU	£154.95	HD2000	20MB HARD DISK WITH PSU	£799.95
MD402C	DUAL 400K 40T DS DD	£209.95	HD4000	40MB HARD DISK WITH PSU	£1299.95
MD802C	DUAL 800K 40/80 T DS DD	£259.95	UFD2000	20MB HD 1MB FLOPPY PSU	£999.95
MD402E	DUAL 400K 40T DS PSU	£249.95	STREAMER	10MB STAND ALONE STREAMER	£799.95
MD802E	DUAL 800K 40/80T DS PSU	£299.95	COMBO	5.25" 40/80 T 400K & 3.5" 400K	£259.95
MD802DM	800K 40/80 T DS PLINTH & PSU	£324.95	NUC 20	20MB HD 10MB TAPE 1MB FLOPPY	£1799.95
MD400F	SINGLE 400K 80T 3.5" DS	£115.95	ARCHIVE	10MB STREAMER & 1MB FLOPPY	£999.95

ALL PRICES INCLUDE V.A.T. WE RESERVE THE RIGHT TO CHANGE PRICES WITHOUT NOTICE.  
FOR FULL DETAILS OF OUR MEMORY DEVICES PLEASE ASK FOR OUR CATALOGUE.



Akhter Computer Group  
Akhter House  
Perry Road  
HARLOW  
Essex CM18 7PN  
Tel: (0279) 443521  
Telex: 818894 AKHTER G  
Dealer Enquiries Welcome





# £40.00 Cash Allowance for your old ROM Expansion Board when you trade in for the Fourmeg 256K

or £10.00 reduction if you already have Solidisk DFS

**T**he memory limit on the BBC Micro can now definitely be a thing of the past. The new Solidisk Fourmeg 256 board offers all you could wish for.

It has 256K of extra RAM, a superfast 4MHz CMOS processor, sophisticated memory management, sockets for high capacity ROMs and 48K of software in ROM.

In fact, it contains even more devices than the BBC itself. It is compatible with most hardware add-ons — except Sideways ROM expansion, which explains why this special offer.

Fitting it is easy. You remove the existing processor from its socket and plug the new board in its place, push on three colour-coded wires, clip on two mini-hooks and it's ready. Switch on the computer and you will immediately see the difference.

The message "Solidisk 256K expansion (4MHz)" announces the new memory size and speed.

A switch at the back lets you select between the old (2MHz) and the new (4MHz) speed.

The BBC Micro at 4MHz easily surpasses the new MASTER 128K on benchmarks.

For example, it runs the benchmark using Basic 4 in only half the time taken on the MASTER 128K.

If you have too many ROMs to plug in at once, the Fourmeg 256 offers TWO ways out. First, it includes additional high capacity (and fast) ROM sockets. Moreover, two or four normal ROM images can be stored in one high capacity ROM chip (by "Vertical Paging") — so more can be made immediately available at your fingertips.

Secondly, ROM images can be stored on discs and loaded into any one of the eight Sideways RAM banks available. If you need more room in "languages" such as VIEW or BASIC, you may use any of the eight SHADOW RAM banks. No user memory is then lost to the screen, whatever the screen mode (while machine coded programs can access RAM right up to &FC00!).

Two frequent uses of the extra memory are as a RAMDISK or a printer buffer.

Star commands in the ROM can turn the extra RAM into a silicon DISK of 200K, compatible with both the Solidisk DFS and ADFS formats. The RAMDISK is at least 10 times faster than physical disc drives as it has no moving parts.

The printer buffer saves you time, it lets you use the computer while feeding your printer in the background.

In addition, the MANAGER ROM offers over 30 star command utilities to save time and effort using the computer.

To complement such a powerful product, Solidisk has arranged with Computer Concepts to bundle the famous WORDWISE PLUS wordprocessor ROM and manuals. This excellent product, worth £45.00 on its own, became the best selling wordprocessor for the BBC computer last year. All in all, the Solidisk Fourmeg 256 offers an unmatched combination of speed, power and built-in facilities, while still having room for even further expansion. It is the most logical next step for the owners of any Sideways ROM board or of Solidisk Sideways RAM, who can trade in their present boards for the excellent Fourmeg 256.

## Yes! I want to take you up on your special summer offer

"I will pay only: (delete if not applicable)



£135.00 instead of the normal price (175), I will send you my old ROM board when I have been satisfied with your Fourmeg 256.



£165.00 instead of the normal price, I already have your DFS installed in my BBC.



I also allow £3.00 for First Class Post.

If for any reason I am not entirely satisfied with your product, I will return it before 15 days and have all my money back (except postage if applicable)".

Name .....

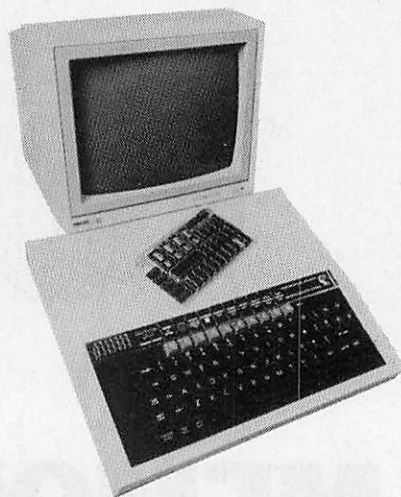
Address .....

Access/Visa Account .....

Send to:

**Solidisk Technology Ltd**  
17 Swayne Avenue, Southend-on-Sea  
Essex SS2 6JQ

We reserve the right to change prices and specifications without notice for improvement.



**SOLIDISK has products to expand your BBC Micro inside out, so why hesitate, pick up the phone and ring this number:**

**SOUTHEND**  
**(0702) 354 674**

**ASK FOR A BROCHURE**



## Shadow, Sideways ROM and Sideways RAM All-In-One for £50:

**T**his board, the TWOMEG-32K, is specifically designed with the SCHOOL BEEB in mind so that one could have everything one wanted on a single, compact and extremely easy to install unit. All the necessary software is in a MANAGER ROM (supplied).

The top row of FIVE ROM sockets will take software ROMs, up to 32K each such as used on the BBC Plus and MASTER 128.

The middle row contains 32K of additional CMOS, low power RAM, acting as SHADOW RAM or as two banks of SIDEWAYS RAM.

The empty 40 pin socket will receive either the normal 2MHz CPU or the optional enhanced, faster 4MHz CMOS 65C02 (the board will be then called the FOURMEG-32K).

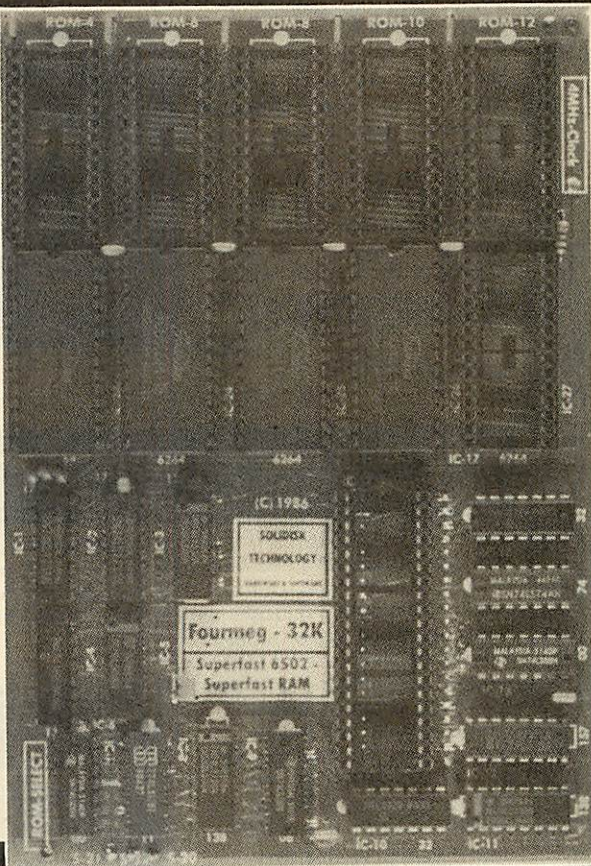
The TWOMEG-32K combined the usual functions of a Sideways ROM board — offering storage for up to 160K on board and 64K on the Beeb itself (a total 224K out of 256K possible) and a SHADOW RAM compatible with major 'language ROMs' such as BASIC, VIEW, WORDWISE, INTERWORD, VIEW-SHEET, VIEW-STORE etc.

When Shadow RAM is in use, a small 8K of Sideways RAM is available for loading ROM images or a small printer buffer. When SHADOW RAM is not in use, the entire 32K additional RAM can be used as TWO banks of SIDEWAYS RAM or as a RAM DISC (available only with Solidisk DFS or ADFS).

The MANAGER ROM also contains a powerful TOOLKIT to assist PROGRAMMING IN BASIC.

The attraction of the TWOMEG-32K board comes from its versatility, its convenient software in ROM and its low price tag. Furthermore, the board can be fitted with a CMOS 65C02 capable for example of running the new BASIC 4 (some 30% faster than BASIC 2 and also more accurate) or upgraded to FOURMEG speed, comparable to the TURBO board on the MASTER.

TWOMEG-32K .....	£50.00
65C02 (2MHz) for the above .....	£10.00
Or upgrade to FOURMEG .....	£25.00
FOURMEG-32K .....	£70.00



## Real Time Clock & Desk:

**T**he Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the BBC Model B with absolutely no other connection to make.

The Real Time Clock is powered by a rechargeable battery which should keep the RTC active throughout the Summer Holidays.

Apart from giving the Time and Date, through \*TIME or TIMES (BASIC 4), the RTC has many of the AUTO-CONFIGURE features of the MASTER 128K with the same command syntax, a friendly DESKTOP program for use with the AMX MOUSE, a DIARY and a Calculator.

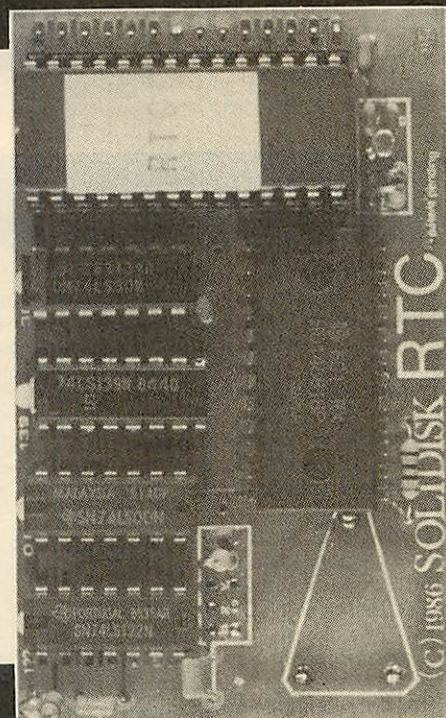
Many additional commands are background commands, leaving your computer free to run your program. They set the time, display the clock in any screen mode, beep at specified time, interrupt and show a message when you have an appointment, perform a specified task at specified time etc.

You can even 'Clock Boot' your computer directly into the DESKTOP, using the MOUSE you can operate the computer without touching the keyboard (ATARI-ST style) until you 'click' on a language ROM or an application program. You can pop down the pocket size calculator, change the time and edit your DIARY (instead of using a word processor).

The Real Time Clock will add fun and convenience to the every day use of your BEEB.

Order as CLOCK .....

£29.00



## In Brief:

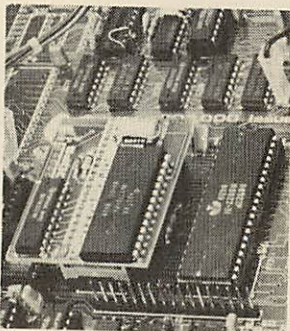
The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K ... £50.00, FOURMEG-32K ... £70.00, SWR64 with S/W pack 1 ... £60.00, SWR128 (new style) with S/W pack 1 ... £80.00, FOURMEG-256K with WORDWISE PLUS ... £175.00, DDFS (1770) ... £35.00, DFDC (1770+8271) ... £40.00, DFS 2.2 ROM ... £15.00, ADFS 2.1 ROM set ... £30.00, 3½ inch (80 track double sided) drive ... £90.00, 5¼ inch drive ... £109.00, 20MB Winchester with PSU ... £745, Linemaster communication ROM ... £10.00, Insight intelligent disassembler ROM ... £15.00, Solimon machine code monitor ROM ... £10.00, Toolkit ROM ... £10.00, S/W pack (1 to 3) of 5 discs ... £10.00, 2764 EPROM ... £1.00 each, 27128 ... £3.00, 27256 ... £6.00, EPROM programmer for 2764/27128 ... £19.00, EPROM programmer for 27256 ... £21.00, EPROM Eraser ... £20.00.



## Double density disc interface

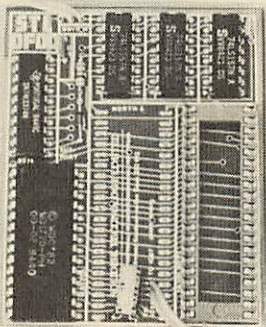
Solidisk very popular Double Density Disc Filing System (DDFS) is based on the WD-1770 floppy disc controller, the same chip used on the Beeb-Plus and the Master series, totally hardware compatible with Acorn 1770 DFS and ADFS ROMs. The DDFS is suitable for virtually any type of floppy disc drives, 3 1/2" and 5 1/4", 40 track and 80 track, single and double-sided with or without power supply unit. New low price without DFS ROM

..... £35.00  
(order as XR/DDFS)



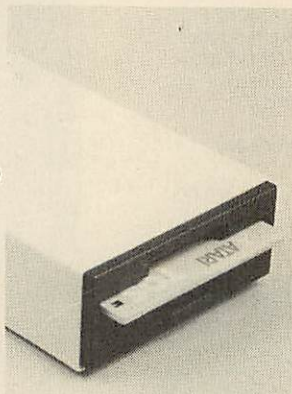
## 1770+8271, dual floppy disc controller interface

Solidisk DFDC (1770+8271) is the best seller in disc upgrades for Model B's already fitted with an INTEL 8271 chip (Acorn, Watford, Pace, Viglen, Cumana etc). It plugs into the 8271 socket with the latter relocated on the DFDC itself. This is the most convenient way of adding the modern and powerful 1770 without sacrificing the 8271 chip. The DFDC is fully hardware compatible with both Acorn DNFS 1.2 and ADFS ROMs, as well as Solidisk DFS 2.2 and ADFS 2.1 ROMs. The Acorn DNFS 1.2 is recommended for use jointly with the Solidisk ADFS 2.1 as both systems 'self-frugalise' to keep PAGE at the lowest value. We recommend the DFS 2.2 ROM alone if ADFS is not required. New low price without DFS ROM ..... £40.00 (order as XR/DFDC)



## Low cost 3 1/2 inch disc drives

The new generation of THIRD HEIGHT 3 and a half inch Floppy Disc Drives offers unprecedented value for money. They feature Double-sided, 80 track per side mechanism offering up to 640K per disc in double density and ADFS. Low power, large capacity, extremely quiet mechanism, robust media and LOWER PRICE than 5 and 1/4 drives make them irresistible. They are also the newly adopted Acorn disc standard. Cased, all leads. One year guarantee. Order as 3.5 INCH-DRIVE (80 track/Double-sided) ..... £90.00 FREE demonstration diskett (double sided) in DFS format while stock lasts (containing a Database, a Word-processor and a selection of games and disc utilities). Separate power supply for BBC Model B, issue 2 or Electron is available at £25.00. Order as 3.5/PSU.



## Special leads

A Special set of leads to connect TWO drives in ANY combination of 5 1/4 and 3 1/2 drives is available separately at only £15.00 or only £8.00 surcharge if supplied in lieu of standard leads. Order as SPECIAL LEADS.

## Advanced disc filing system ROM-set (two 16k EPROMs) version 2.1

The finest product yet for any BBC computer fitted with the 1770 Floppy Disc Controller (Model B, Plus and Master 128K and Electron) encompassing many Master 128K specifications. The list of features is so extensive that it would require a lot more space to describe it. In brief, it has ALL the features of the 2.2 DFS ROM except device drivers for the INTEL-8271 chip, full ADFS implementation comparable to the MASTER 128K. Plus ADFS-FORMAT (FORM40, FORM80 and FORM160) and VERIFY. Plus MVDIFS and MVADFS to transfer files between DFS and ADFS formats with automatic PAUSE for disc change rendering possible to operate with a single drive. Low PAGE value. Compatible with 6502, Z80, 32016, 80186 (Master version) Second Processor. Two manuals.

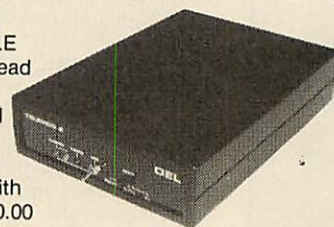
Normally £30.00 but if order with DDFS or DFDC only ..... £20.00 Please mention computer model when ordering. Order as ROMS2.1S. Also available on a single 32K EPROM as ROM2.1/32.



## Single and double density disc filing system ROM version 2.2

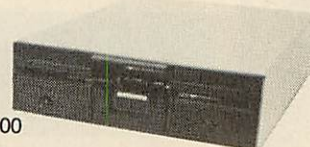
The most powerful and versatile DFS ROM available for the BBC model B, the BBC Plus and the Master 128K. Suitable for both 8271 and 1770 Floppy Disc Controller. Double density allows up to 60% increase over conventional format or 640K storage per (80 track double-sided) disc. Extensive features include 40 and 80 track software switch, unlimited filenames in catalogue (as opposed to Acorn 31), automatic Read after Write. It works with Z80, 6502 second processors and Econet and also is very fast on comparative review benchmarks. Built-in commands include FORMAT (F40 and F80), VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK etc... Also, ENABLE M allows IBM PC discs to be read or written to. Extensive User Manual covers many technical details. Supplied on 16K EPROM.

Normally £15.00 but if order with DDFS or DFDC only ..... £10.00 Please mention computer model when ordering. Order as ROM2.2.



## Unbeatable quality 5 and 1/4 inch disc drives

Also available are NEC or MITSUBISHI 5 and 1/4 inch, 80 track, double-sided drives at a very attractive price. Cased in matching cream colour, all leads. Only ..... £109.00



## Free bridge unit for twin drive systems

If you pay for two drives on a single order, we will offer you, absolutely FREE this practical BRIDGE unit. Solid steel construction, suitable for all Models of BBC and Master 128K.

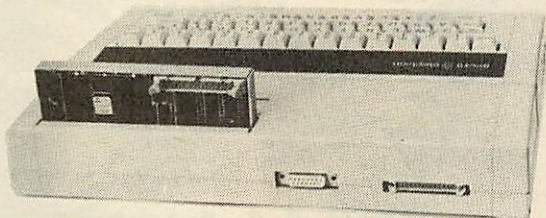


### Electron Disc Interface:

This unit (EFS) plugs into the PLUS-1 Expansion and allows connection of a twin disc drive system and a Winchester. The Disc Interface is based on the same WD1770 chip as used on the Beeb. The Electron Disc Filing System software in ROM (32K) is a version of the Solidisk ADFS 2.1 thus offers a large degree of compatibility with Beeb software. The system is capable of both Beeb DFS format (single and double density) and ADFS format as used on the Acorn PLUS-3. The unit also has a 16K of Sideways RAM which can be used to load ROM images. The unit is guaranteed for one full year but we warn the users that the built-in Sideways RAM is UNRELIABLE hence the reduced price of only:

£50.00.

Use a disc system with built-in power supply unit.



## Old Style SWR32 and 128K:

This exceedingly popular system (30,000 plus units sold) enables the Beeb user to load one or two ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play games, run bigger BASIC, store music and innumerable other uses as supported by a library of 15 software diskettes.

The SWR32 system consists of a BASE UNIT which plugs into the rightmost ROM socket on the BBC board and a (exchangeable) RAM CARD. The RAM CARD also has extension socket for a piggy-back memory board capable of bringing the extra memory to 128K bytes of RAM.

This system is now superseded by the new FOURMEG series and therefore offered at a knock-down price of **ONLY £20.00** for a complete unit, excluding software. The 96k add-on piggy-back memory board is also greatly reduced.

Order as SWR32 ..... £20.00

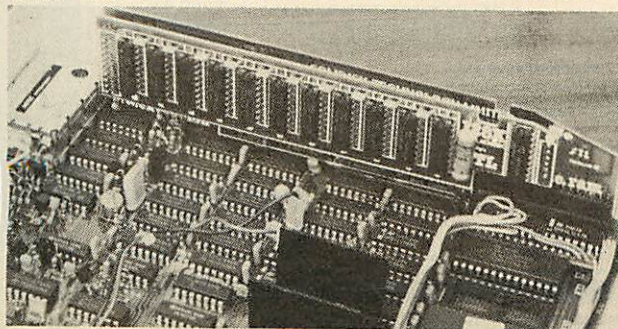
Order as SWR128 (SWR32 with 96K extension) . £50.00

NB: Manual supplied but software (not strictly required) not included.

The supportive software is a series of 15 diskettes, available on either 40 or 80 track DFS diskettes. You can buy any number of VOLUMES although we recommend you buy by PACK of FIVE volumes. PACK 1 (volumes 1 to 5) contains general applications such as MENU, PRINTER, DFS0E00, SILEXICON etc. PACK 2 contains programming applications (SOLIMON, SOLITRACE, TELETEXT EDITOR, SPRITES, DFS and ADFS etc). PACK 3 contains exclusively computer games. Each diskette is priced at only £2.00, software PACK is £10.00 for 5 diskettes.

Order as VOL. XX ..... £2.00

Order as VCE/PA .....£10.00	
Order as SOFT/PACK 1 or 2 or 3 .....	£10.00



## Secondhand Refurbished Beebs:

As a result of the Solidisk MASTERPLAN, we have to dispose regularly of SECONDHAND, refurbished, complete with Double Density DISC INTERFACE, thoroughly checked and fully guaranteed (Labour only) BBC Model B's. Price vary with issues and ages, commencing from £150.00. Please ring for brochure



## In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K . . . £50.00, FOURMEG-32K . . . £70.00, SWR64 with S/W pack 1 . . . £60.00, SWR128 (new style) with S/W pack 1 . . . £80.00, FOURMEG-256K with WORDWISE PLUS . . . £175.00, DDFS (1770) . . . £35.00, DFDC (1770+8271) . . . £40.00, DFS 2.2 ROM . . . £15.00, ADFS 2.1 ROM set . . . £30.00, 3½ inch (80 track double sided) drive . . . £90.00, 5¼ inch drive . . . £109.00, 20MB Winchester with PSU . . . £745.00, Linemaster communication ROM . . . £10.00, Insight intelligent disassembler ROM . . . £15.00, Solimon machine code monitor ROM . . . £10.00, Toolkit ROM . . . £10.00, S/W pack (1 to 3) of 5 discs . . . £10.00, 2764 EPROM . . . £1.00 each, 27128 . . . £3.00, 27256 . . . £6.00, EPROM programmer for 2764/27128 . . . £19.00, EPROM programmer for 27256 . . . £21.00, EPROM Eraser . . . £20.00.

## Order Form

ITEM	PRICE
1) .....	
2) .....	
3) .....	

**ADD post and packing .....£2.00**  
(£3.00 for disc drive)

TOTAL:

Name .....

Address .....

Access/Visa Account : : : : :

**Send to:**

**Solidisk Technology Ltd**

17 Swayne Avenue, Southend-on-Sea  
Essex SS2 6JQ

We reserve the right to change prices and specifications without notice for improvement.



# MEGABYTE MIRACLES

**ONLY  
£209.95**

**2 MEGABYTE DUAL DRIVE**  
5¼" double-sided 80/40 track  
switchable disc drive. Formatted  
capacity with DDOS 1.4 Mb

**ONLY  
£109.95**

**1 MEGABYTE SINGLE DRIVE**  
5¼" double-sided 80/40 track  
switchable disc drive. Formatted  
capacity with DDOS 720K

**D**on't miss this amazing special offer from Opus — a choice of powerful 1 or 2 Megabyte disc drives at simply magic prices.

Choose our 1 Megabyte drive for just £109.95 or 2 Megabyte dual drive offering for only £209.95. Our prices even include VAT and FREE delivery! And, if you need an interface, add just £40 to the cost of either of our special offer drives and we'll supply you with one of the best double-density systems on the market — the Opus DDOS.

## OPUS DRIVES

Our 5¼" drives are double-sided, 80/40 track hardware switchable models representing the very latest in disc drive technology and offering superb performance. They feature reliable direct drive mechanisms, low power consumption and fast track access times and they're backed by our no-quibble 2 year guarantee.

## THE OPUS DDOS

Our highly acclaimed DDOS is probably the most advanced double-density disc interface available and if you choose one of our Megabyte bargains we'll slash £20 off the normal retail price — it's yours for just £40.

Our disc interface uses the same disc controller chip as the BBC B+ allowing you to run all leading software titles — just phone for our comprehensive listing.

The Opus DDOS handles tape to disc transfers, Format and Verify utilities are included on ROM and its powerful machine code operating system gives you up to 248 files — the perfect partner for your new Opus disc drive.

Simply post the coupon or call Opus now on **0737 65080** — we'll guarantee delivery within 72 hours. Our Megabyte Miracles offer is available for a limited period only, so call today to avoid disappointment.

Generous education and dealer discounts available.

To: Opus Supplies Limited, 55 Ormside Way, Holmehorpe Industrial Estate, Redhill, Surrey.  
Please rush me the following: (PRICES INCLUDE VAT AND CARRIAGE)

\_\_\_\_\_ 1 Megabyte (unformatted) System(s) at **£109.95** each  
\_\_\_\_\_ 2 Megabyte (unformatted) System(s) at **£209.95** each  
\_\_\_\_\_ Opus Double Density Disc Interface at **£40.00** each  
(Only when purchased with drive)

I enclose cheque for £ \_\_\_\_\_ or please debit  
my credit card account with the amount of £ \_\_\_\_\_

My Access ☐ Visa ☐ no. is:

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

TELEPHONE \_\_\_\_\_

**Opus.**

**☎ 0737 65080**



If you own a BBC Micro, Commodore 64 or Spectrum 48k/128k - you could have a totally automated home at your command.

It's time your computer grew up and realised its full potential - as something more than a data base, a word-processor or an expensive toy for your kids. From now on, your home computer can do a lot more than play games.

The Red Boxes control system lets your computer earn its keep defending your home against intruders, acting as a round-the-clock security system, giving you control over any electrical appliance whether you are in, or out.

The Red Box starter system takes you right into the exciting world of home automation from as little as £129.

#### Just plug in for a more efficient home.

Simple to operate, it plugs straight into your home's ring main and needs no other wiring. You don't need any programming experience to operate it.

The system can control internal and external lighting, on/off switches and dimmers in different rooms in different sequence. It can activate washing machines, tumble driers, dishwashers, hi-fi, television, heaters - in fact, everything operating through your mains via a 13 amp plug.

#### Prevent daylight robberies.

Most burglaries happen during the day, so the Red Boxes control system works just as hard then as it does at night.

If an intruder enters your home, the Red Boxes control system will see him off sharply.

As soon as its sensor is disturbed, the alarm will raise the roof.

However, more importantly this system can also deter people entering your home by creating an appearance of constant activity.

#### Turn your home computer into a command terminal.

The Red Box starter system comprises three red boxes.

RED LEADER is a complete 6502 based microcomputer with 16 kbytes ROM, 8 kbytes RAM, peripheral controller with 2400 baud mains modem and host computer link, with an integrated power supply. Its powerful micro-processors turn your micro-computer into a command terminal. This is the heart of the system - its even sophisticated enough to recognise which type of computer you own!

RED ONE is a micro-processor controlled 13 amp mains outlet working under the supervision of Red Leader. With Red One at a socket you have power over domestic appliances and lights connected to that outlet.

RED TWO is a complete micro-processor controlled movement detector which feeds back data to Red Leader via mains borne signals - raising the alarm on intruders as soon as they enter its heat seeking zone.

#### Unique tamper-proof security.

Our Red Boxes operate a secure communications protocol. Incorporating tamper-proof PIN codes. All 'slaves' - outlets, sensors, switches - are first introduced to Red Leader using their own secret 24 bit address. Secret 'keys' are assigned to every device - lights, TV etc., known ONLY to you, and messages between devices are also encoded using random numbers to further secure the system.

No other Red Leader knows your slave codes; therefore no unauthorised person can interfere with the operation of your system.



#### Computer to computer communication.

Communication is a vital aspect of our Red Boxes system.

Controllers are not isolated from one another - they are connected with each other, through the mains borne system and so communicate with each other and with Red Leader. If Red Two sends a message to Red Leader indicating an intruder, Red Leader responds by telling a switch unit to activate the alarm.

If you operate two home computers, they can communicate with each other through the system, enabling you to set them more complex tasks. And because Red Boxes have integral micro computers, this leaves your home micro free for normal use outside Red Boxes programming.

#### The possibilities are endless.

Our Red Boxes are ready for them. With humidity detectors, sensors or additional motors, this system can be used for weather monitoring, aerial rotation, home brewing, greenhouse thermostat control, keyless access via electronic door locks, remote access

control via a telephone modem - even a robotic arm for performing simple mechanical tasks like tea making and shoe polishing. One day we might even invent one to iron shirts, why not. Our Project Manual at £9.95 describes a whole series of exciting applications.

#### Trial run.

For a FREE 14 day trial of the Red Boxes control system WITHOUT OBLIGATION complete the coupon and post to: Electronic Fulfilment Services Ltd., Chesterton Mill, French's Road, Cambridge CB4 3NP.

Your Red Boxes control system will be delivered within 28 days and if you are not delighted for any reason just return it to us for a full refund.

The Red Box starter system costs £129.

And additional Red One and Red Two Boxes are £34.95 each.

JUST PLUG IN AND SEE WHAT YOUR HOME COMPUTER IS MADE OF.

To: Electronic Fulfilment Services Ltd., Chesterton Mill, French's Road, Cambridge CB4 3NP

Please send me the Red Box starter system at £133 (inc. £4 p.&p.)

My microcomputer is a BBC Micro/Commodore 64/Spectrum 48k/128k. (Delete as applicable.)

Also include: \_\_\_\_\_ Project Manuals at £9.95.

\_\_\_\_\_ additional Red One control boxes at £36.95 each. (inc. £2 p.&p.)

\_\_\_\_\_ additional Red Two infra red sensor boxes at £36.95 each. (inc. £2 p.&p.)

I enclose a cheque for a total of £\_\_\_\_\_ made payable to General Information Systems Ltd. Readers' Account.

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

A.I.

Enquiries on technical specifications and special applications, contact the address above.



# RED BOXES



# TWILLSTAR COMPUTERS LTD

FREE CATALOGUE and full price list. Call now for your issue.

## Computers

### MASTER 128

Complete With Internal Software	£454.25
Master Turbo Upgrade	£113.95
Master Econet Module	£46.00
Master ET	£373.75
Master 512 Upgrade	£389.00
Master SC Upgrade	T.B.A.
Eprom Cartridge	£14.95
Reference Manual Part 1	£14.95
6502 Second Processor	£179.00
Z80 Second Processor	£379.00
Acorn Prestel Adaptor	£125.00
Acorn Teletext Receiver	£135.00

Winchester Disk Drive 10 MBYTES	£1250.00
Winchester Disk Drive 30 MBYTES	£1850.00
IEEE Interface	£299.00
Music 500	£178.00

### ECONET ACCESSORIES

100m Cable	£89.00
Station Lead Set	£29.00
Econet Starter Kit	£99.00
Econet Bridge	£199.00
Level 1 Fileserver 40 Track	£99.00
Level 2 Fileserver 80 Track	£235.00
Print Server Eprom	£49.00

## BBC Upgrades

64K Upgrade Kit	£39.95
17/70 Upgrade Kit	£49.94
ADFS ROM	£29.95
Disc Upgrade Kit	£89.00
Econet Upgrade Kit	£49.00
Speech Upgrade Kit	£49.00
DNFS ROM	£20.00

### CUMANA DISK DRIVES

5.25" DRIVES EXC. PSU	
CS x 100	£99.00
CS x 400S	£135.00
CD x 200	£185.00
CD x 800S	£235.00

### 5.25" DRIVES INC. PSU

CS100	£129.00
CS400S	£149.00
CD200	£218.00
CD800S	£265.00

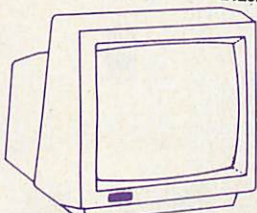
### 3.5" DRIVES INC. PSU

CS354	£125.00
CD358	£195.00

## Monitors

### MONOCHROME MONITORS

Phillips BM 7502 Green Screen	£79.00
Phillips BM 7522 Amber Screen	£95.00
Kaga KX 1202G Hi Res Green	£120.00
Kaga KX 1203G Ultra Hi Res Amber	£120.00



Hantarex Hx 12 Dark Gloss Screen high resolution monochrome monitor 12" Composite Video & Audio input £89.00

### TV MONITORS

Phillips 1114 colour TV/monitor with 14" tube offering 10 Preselect channels RF CVBS and RGB inputs £199.00

## Special Package

The TCL All in One Word Processing Package contains a Master 128, View 3.0, Viewsheet, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. £914.25

## SPECIAL OFFER

### KX-P 1080 DOT MATRIX PRINTER

- \* NEAR-LETTER QUALITY PRINTING IN ALL PITCHES
- \* OPERATOR ACCESSIBLE PRINT MODE SELECTOR (Std./Pgm., NLQ, Comp.)
- \* FRICTION FEED AND ADJUSTABLE TRACTOR ARE STANDARD
- \* WORD PROCESSING FUNCTIONS (Justification, Centering, L&R alignment)
- \* PROPORTIONAL SPACE PRINTING
- \* HIGH RESOLUTION, DOT-ADDRESSABLE GRAPHICS

## Printers

### DOT MATRIX PRINTERS SPECIAL OFFER

Juki 5510 - Gives you 180 CPS & NLQ Standards £269.00 Inc. VAT

...and thats not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instant compatibility with both the Epson and the IBM Graphic Printer), Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets. If you need colour too, the optional Juki 5510 Colour Kit gives you seven colours. £112.00

### CITIZEN 120 D

With 120 CPS and 25 CPS NLQ comes with tractor and friction feed as standard. IBM end Epson Compatible with TWO years Warranty £159.00

### CITIZEN MSPIO

The new MSPIO with 160 CPS Draft and 40 CPS NLQ. With TWO years Warranty £269.00

### BROTHER M1109 NLQ

Printer 100cps Directional Logic Seeking Friction feed and secondary optional tractor feed £189.00

# YOUR ONE STOP MEGA-COMPUSTORE FOR

## Disc Drives

### MITSUBISHI DISC DRIVES

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 Track switchable at the front and have two years warranty.

### 5 1/4" Drives without P.S.U.

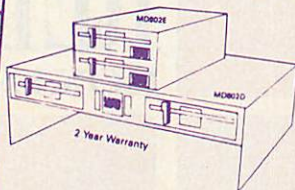
MD 400A Single 400K Double Sided	£118.00
MD 802C Dual 400K Double Sided	£219.00

### 5 1/4" Drives with P.S.U.

MD 400B Single 400K Double Sided	£135.00
MD 802E Dual 400K Double Sided	£249.00

### SPECIAL

MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. £289.00



We are unable to list all the products that we stock—Please call for further details or visit our NEW SHOWROOM

### COLOUR MONITORS

Microvitec 1431 Std Res	£201.25
Microvitec 1451 Med Res	£270.25
Microvitec 1441 Hi Res	£391.00
Microvitec 2030 Cs 20 Std Res	£425.50
Microvitec 1431 AP Std Res	£224.25
Microvitec 1451 Ap Med Res	£293.25
Phillips CM 8501 STD Res Monitor with grey glass Screen RGB and Audio input	£209.00
Phillips CM 8533 Med Res monitor with dark glass etched screen composite video input RGB and Audio Input.	£289.00

### OUTSTANDING PERFORMANCE

#### OUTSTANDING VALUE

Just released by Hantarex 14" Colour Monitor Standard Resolution RGB PAL Audio Input (Inc. VAT) £189.00

### SPECIAL OFFER

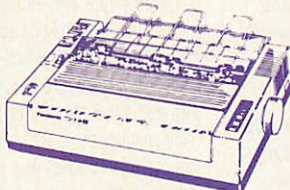
Mitsubishi 1404 Medium Resolution Monitor with 640 X 200 Pixels RGB available with IBM or BBC Leads. £229.00

Taxan Super Vision III

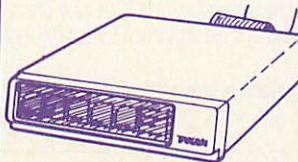


This display is designed for business use which provides both high-res monochrome (Green, Amber, and White reverse) mode and high-res Colour graphic mode all in one. £369.00

- \* UP TO 40 DOWNLOADABLE CHARACTERS
- \* COMMAND CODE COMPATIBLE WITH POPULAR PRINTER SOFTWARE
- \* PRINT SPEED, DRAFT: 100 NLQ: 20 COMPRESSED: 86
- \* 9 PIN PRINT HEAD



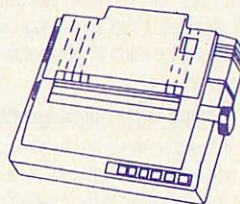
The Panasonic KX-P 1080 impact dot matrix printer is ideal for applications that require economical high quality printing. It offers a variety of print modes, all producing crisp clearly formed characters. Wide choice of print sizes includes semi-compressed and compressed (even in near-letter quality printing). Operator accessible print mode selector adds convenience. For a reliable printer at an affordable price, the KX-P 1080 is always a smart choice. £159.00



Now available Taxan Multipurpose Type Printer Buffer KIF-4308 compatible with any Centronics interface printer £149.00

### KAGA KP810

The 80 column printer with 140 CPS Draft and NLQ with friction and tractor feed offering 9 INT character sets. Long life cartridge ribbon and standard centronics interface. £249.00



### NEW

#### STAR NL-10

Fine Near-Letter-Quality. 100% compatibility and total reliability all in one easy to use printer. For quality, ease of operation and dependability, nothing beats the Star NL-10. You get outstanding print quality at 120 cps in draft mode and 30 cps in near letter quality. Plus, the sleek NL-10 offers full compatibility with most popular computers through plug in interface cartridges. Just insert the appropriate plug in interface cartridge for your IBM-PC, Commodore, Apple IIc or other parallel computer and your Star NL-10 is ready to print. Touch a button on the control panel to set the print pitch (3 choices), to select the typeface and to print in either draft or NLQ mode. You can even set left and right margins, make top of form settings and control forward and reverse feed in the smallest pitch. £229.00

### EPSON LX80

With 100 CPS draft and 16 CPS NLQ and optional tractor adaptor and sheet feeder. This printer has a standard parallel connection and accepts all other Epson serial Parallel boards with external dip switches for easy access and internal IK buffer. It offers a high specification at a low price. £229.00



## Printers

### EPSON LQ800

24 Pin Dot Matrix Printer offers a high 200 CPS draft speed and near letter quality at 67 CPS with high resolution graphics and a variety of fonts £585.00

### ALSO AVAILABLE

Epson FX 85	£365.00
Epson FX 105	£495.00
Seikosha GP 50A (Parallel)	£69.00
Seikosha GP 50S inc.	£69.00
Printer I/F + cables	£249.00
Canon PW 1080A (NLQ)	£379.00
Canon PW 1156A	£228.00
Brother EP 44	£189.00
Shinwa CP 80A	£240.00
MP 165	

### DAISYWHEEL PRINTERS

QUENDATA DWP 1120 with optional tractor/sheet feeder and 13" paper width facility. This Daisywheel printer with 20 CPS has 96 character printwheel compatible with the QUME. Standard centronics interface.

(optional RS232 C)	£169.00
Brother HR 15 XL	£389.00
Juki 6100	£285.00
Juki 2200	£275.00
Juki 6300	£799.00

### COLOUR PRINTERS

Canon PJ1080A	£440.00
---------------	---------

### TRACTOR ADAPTERS

FX85	£33.00
LX80	£23.00
Juki 6100	£129.00
Juki 6300	£119.00
Quendata DWP 1120	£124.00
Brother HR 15	£95.00
LQ 800	£43.00

### SHEET FEEDER

Juki 6100	£173.00
Juki 6300	£173.00
Quendata DWP 1120	£165.00
Brother HR 15	£212.00
LX80	£55.00

### JOYSTICKS

Voltmace 14b Handset	£14.95
3b Singlet	£12.95
3b Duellset	£19.95
14b Interface	£14.95
DRAWER Cassette	£5.95
DATAPAD Keyboard	£39.95

### SERIAL INTERFACES

EPSON 8143	£34.00
JUKI	£58.00
CANON	£91.00
KAGA	£85.00
Epson 8148 + 2K buffer	£85.00

### LISTING PAPER

11" x 9 1/2" 2000	£14.00
Teleprinter Roll	£4.50
Teleprinter Roll Holder	£14.00

### PRINTER LABELS

1000 90 x 36mm 1 across	£5.70
1000 90 x 36mm 2 across	£6.70
1000 90 x 36mm 3 across	£7.70

### PRINT FEED SYSTEM

Revolutionary low cost Printer Feed System tidies up all Micro Desks - No more paper on the floor. £35.00

### MONITOR ACCESSORIES

Monitor stands single	£11.50
double plynth Metal	£21.00

### NEW

### PRINTER STAND

Fits nearly any width of printer. Allows paper storage and gives ideal viewing position. Can also be used for computers and monitors. Steel construction prevents bending or buckling £18.00

### BBC BOOKS

BBC B Compendium	£5.95
Advanced Disk User Guide	£14.95
Advanced Basic Rom User Guide	£9.95
The Epson FX Kaga Printer Commands Revealed	£5.95
BBC Micro Disk Drives	£6.95
Complete Disk Manual	£7.95
The BBC Micro Rom Book	£9.95
The Super User's BBC Micro Book	£9.95

GXR B+	£29.00
View 3.0	£85.00
Hi-View	£55.00
View Store	£52.00
LSP ROM	£49.00
BASIC Editor	£28.00
Temulator	£31.95
Microprog	£69.95

### COMCONCEPT

Wordwise	£36.00
Wordwise Plus	£46.00
Intersheet	£55.00
Disk Doctor	£27.00
Printmaster (Epson)	£27.00
Printmaster (Star)	£27.00
Caretaker	£27.00
Graphics ROM	£59.00
Communicator	£55.00
Accelerator	£27.00
Gremlin Debug ROM	£33.00
Interchart	£30.00
Speech ROM	£10.00
Speech Processor	£55.00
Interword	£55.00
Interbase	

### BEEBUG

Toolkit Plus	£39.00
Wordcase	£29.00
ICON Master	£34.00
Studio Eight	£22.00
ROMIT	£34.00
Exmom II	£28.00
Spellcheck II	£29.00
Spellcheck Wordwise	£29.00
Spellcheck View	£29.00

### CLARES

Frontwise Plus	£19.00
BROM+	£34.00
BROM	£32.00
Wordcase	£27.00

### ALTRA

Enigma Disk Imager	£42.00
Tube Editor	£42.00
Probe I	£34.00
Basic Editor 2	£34.00
Basic Editor I	£25.00
First Aid II	£19.00

### GEMINI

Datagem Database	£79.00
------------------	--------

### GAMES DISK

All the latest games in stock Call for details!!!

## Services

Many components now in stock. Call for details and price.

### SERVICES

Fast Repair Service for the BBC Computer	
average charge from	£23.00
Printer repairs from	£20.00
Disk Drive repairs from	£15.00

### BBC COMPUTER SPARE PARTS AND COMPONENTS

PSU	£59.00
Keyswitch	£2.00
Complete Keyboard	£59.00
Keyboard Connector	£5.18
UHF Modulator	£5.18
Video ULA	£20.00
Serial ULA	£16.00
6522 VIA	£4.10
6502 2 MHZ CPU	£7.50
UPD 7002	£17.25
6845SP CRT CON	£7.50
SAA 550 Teletext	£10.35
LM 324	£0.50
6522A 2 MHZ VIA	£6.33
8271	£52.00
74 LS 123	£0.46
74 LS00	£0.28
74 LS04	£0.28
74 LS10	£0.28
7438	£0.46
74 LS 163	£0.86
74 LS 244	£0.92
74 LS 245	£1.27
74 LS 375	£1.04

# HOME, EDUCATION & BUSINESS NEEDS!

### RIBBONS

Full selection of Ribbons available. Call for latest prices & availability.

### FONT AID

Fontaid BBC	£30.00
Fontaid additional Disk	£15.00
ROMS of individual fonts	£18.00

## Accessories

Raven Discs Double Sided, Double Density 96 TPI uses 3M media. Guaranteed for life. Free library Box included £17.00

### NIGHTINGALE MODEM

Including Commstar and Comprehensive Manual £130.00

Auto Dial/Auto Answer Board £55.00

Auto Dial Utilities Disc £11.00

OBBS Bulletin Software £23.00

### EPROMS

2764 £2.20

27128 £3.95

### RAMS

6264 LP 15 £3.95

EPROM Extactor £5.00

EPROM Eraser £32.00

Soft Life EPROM Blower £75.00

visit our  
NEW SHOWROOM  
Open 9am-6pm Mon-Sat  
OPEN SUNDAYS 10-2

View BBC	£10.00
View Store	£10.00
Viewsheets Electronic S/Sheet	£10.00
BBC	9.95
Wordwise Plus	

### AMX MOUSE & SOFTWARE

AMX Mouse with Super Art ROM	£79.00
AMX Pagemaker	£49.95
AMX 3D Zicon	£24.95
AMX Database	£24.95
AMX XAM	£24.95
The Original AMX art Plus Utilities	£14.95
AMX Paintpot	£14.95
AMX Desk	£24.95

### SYSTEM SOFTWARE

THE MUSIC SYSTEM	
Disk Pack	£29.95
Cassette 1	£14.95
Cassette 2	£14.95

### EXPANSION BOARDS

Computer Concepts Sideways Board	£45.00
----------------------------------	--------

### RAMAMP

RA20 +44	£79.00
RA32N	£59.00
RA32+	£58.00
ROM6S	£32.00
RAM16	£32.00
WPK for all above	£5.00

## BBC Firmware

FIRMWARE	
Acorn View Word Processor	£52.00
Acorn View Sheet	£52.00
Acorn Logo ROM	£65.00
Acorn ISO Pascal	£65.00
Acorn BCPL	£99.00
GXR	£29.00

### LBO

Life & Business Organiser £19.50

### PACE

Commstar	£33.00
System ADE ROM	£60.00
System SPY ROM	£30.00
Edward User Pack	£44.00
Edward Teacher Pack	£25.00
BBC Ultracalc II	£79.00

### VINE

Replay ROM	£34.00
TD ROM	£18.00

## Disc Utilities

View Index	£14.90
View Printer Driver	
Generator	£10.90
Hi View	£55.20
Acorn Soft Database	£14.25
Clares Database	£21.85
Clares Graphdisc	£12.30
Clares Replica III Disk	£13.95
Clares the Key Disk	£12.30
Betabase Utilities	£11.00
Beta Accounts	£21.95
Profile	£11.00
Micro Text Disk	£55.20
Beebugsoft Design	£18.00
Beebugsoft Masterfile II	£18.00
Beebugsoft Teletext Disk	£10.90
Beebugsoft Sprites Disk	£10.90
Beebugsoft Disk Master	£18.00
Beebug Billboard Disk	£18.00
Beebug Quickcalc Disk	£14.25
Beebug 'Hershey' Font	£14.25
Beebug Paintbox II Disk	£12.30
Gemini DDD Base	£29.00
Gemini DDD Calc	£29.00
Gemini DDD Plot	£29.00
Office Mate	£12.00
Office Master	£25.00
Fleet Street Editor	£39.95

## How to Order

You can purchase any of the items listed. All you have to do is write your requirements on a sheet of paper, and we will despatch your goods within 24 hours, subject to availability. Please add the following amounts for Postage and Packing.

Items below £10.00	add £1.50
Items below £50.00	add £2.50
Items below £100.00	add £3.50
Items over £100.00	add £8.00

(UK Mainland only)  
All prices include VAT at 15%  
'No Hidden Extras'

Please make cheques payable to:

**TWILLSTAR COMPUTERS LTD.**

Access/Visa Card Holders:

Welcome. Call now on:-

**01-571 5938 or 574 5271**



### CREDIT FACILITIES

Full credit facilities now available nationwide

\* LOW DEPOSITS

\* FAST FRIENDLY SERVICE

\* UP TO 3 YEARS TO PAY

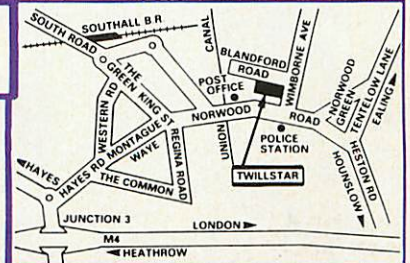
Call for further details  
Typical APR 36.3%

## TWILLSTAR COMPUTERS LTD

APEX HOUSE, BLANDFORD ROAD,  
NORWOOD GREEN, SOUTHALL,  
MIDDX UB2 4HD

Tel: 01-574 5271 01-571 5938

Telex: 25247 Telex G. attn TIL



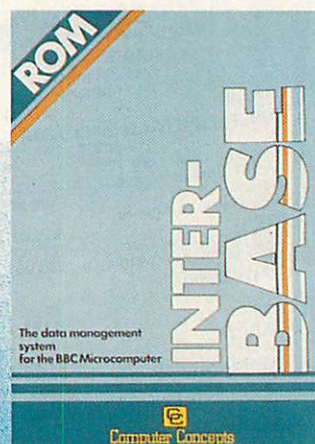
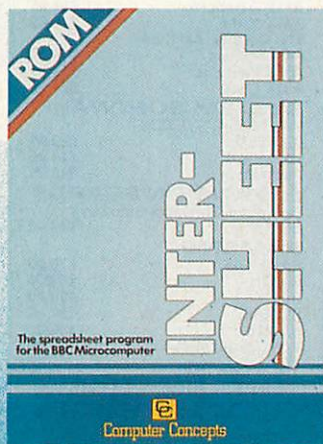
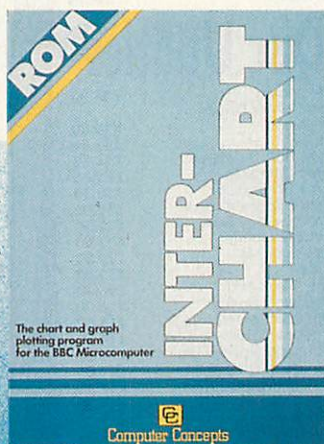
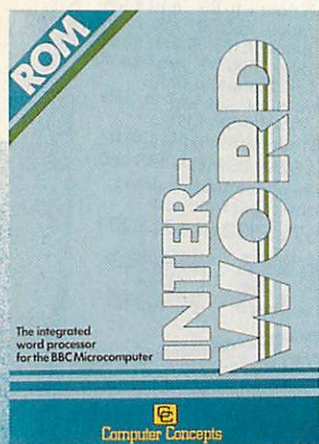


# The only truly integrated suite of ROMs

This unique system allows all ROM-LINK compatible ROMs to be fully integrated. Up to 16 'packages' can be held in memory at once, so for example you could have a spreadsheet and a chart and a document in the word processor all being worked on at the same time. The



ROM-LINK system also allows any data to be transferred directly from any package to anyother. For example spreadsheet data could be imported into the word processor, and then back again into the spread-sheet, then into INTER-CHART to plot a graph.



\* TO BE RELEASED SOON

**FOR THE BBC MICRO**



Computer Concepts

The Master Compact  
Compatible



# INTER-WORD

The latest word processor from the same stable as WORDWISE and WORDWISE PLUS, the most successful programs ever written for the BBC Micro computer. With years of experience and feedback from users, the authors of INTER-WORD have ensured that it suits everyone's needs. A great deal of attention has been paid to ensuring that INTER-WORD is fast, efficient and above all simple to use. Being menu operated the newcomer does not need to remember strange key combinations or command names. The menus are not a burden to the experienced user since there are shortcuts to access many of the features.

## REVIEWS

"the most significant program since WORDWISE" ...  
"INTER-WORD on the BBC Micro compares favourably with word processors costing five or ten times as much on the IBM PC and the like." ... "INTER-WORD is a real pleasure ... a truly worthy successor to WORDWISE"

Gordon Taylor A&B Computing

"Rulers can be used to manipulate text to your satisfaction. This is a joy to use."  
"INTER-WORD is certainly an advance on most other word processor packages"

Popular Computing Weekly, July '86

Technically, too, the program is astounding ...  
"... quite stunning handling characteristics"

Viewfax Tubelink—August '86

"INTER-WORD is the most powerful and comprehensive word processor available for the Beeb today. It is more powerful and flexible than View and still retains much of the friendliness and ease of use of Wordwise. Inter-Word looks set to become the standard word processor for the BBC Micro"

Beebug, Aug/Sept '86

Some of its special features are:

### •Automatic re-formatting

This enables the user to just type - no keys to press to re-format the paragraph after changes to the text or margins have been made; the margins on the rulers can simply be dragged, all text being instantly re-formatted to the new settings.

### •Multiple documents in memory.

Most people do not work on one document at a time. INTER-WORD allows up to 16 documents to be stored in memory at once, and text to be transferred from one to another.

### •Multi column

Built in facilities for printing text in up to 5 columns.

### •Pull down menu operation

Simple and fast selection of all INTER-WORD options and page layout.

# 20%

 discount

Available to all WORDWISE PLUS owners. Simply quote your serial number, name and address when ordering direct. Discount price; £39.20 + VAT (£45.08 incl.)

## THE NEW WORDPROCESSOR FOR THE BBC MICRO

Multi-file	File list
Current document	CHAPT1 1
Manual	CHAPT2 3
Current file	CHAPT3 10
CHAPT1	CHAPT4 17
	CHAPT5 24
Insert filename	CHAPT6 30
Remove filename	CHAPT7 37
Print document	INDEX 45
Create new document	

### •Multi-file operation

Very large documents can be handled with ease. INTER-WORD's unique multi-file mode puts virtually no limits on document size and allows simple and fast movement to any point in the document.

### •Block operations

These are common to most word processors, but with INTER-WORD any part of the text can be marked and then instantly moved, copied, deleted, printed, saved, underlined etc. There is no limit to the amount that can be marked.

### •Specific page printing

Any page or range of pages may be printed, even in multi-file mode, with any number of copies.

### •File selector

The file selector displays a list of all files - move to one and select it. You will never have to type or remember filenames again.

Save entire text		
!BOOT	11	accounts
CHAPT1	CHAPT2	CHAPT3
CHAPT4	CHAPT5	codes
DUMP	EXAMPLE	flist
FSEL	INDEX	IWERRATA
IWERRATA1	IWORD	LABELS
LABLIST	LETTERS	LOAD
MANUAL	PRINTERS	RAMDUMP
RUBBISH	\$1	

Select or enter filename

£49.00 + vat (£56.35)



Computer Concepts

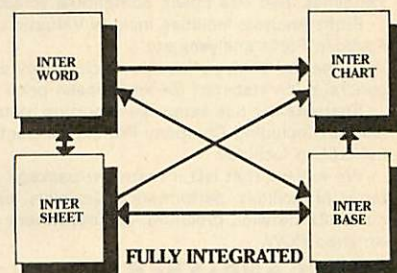
Gaddesden Place, Hemel Hempstead,  
Herts. HP2 6EX, England.  
Telephone (0442) 63933

### •On screen style changes

Underline, bold and a special 'dotted' style are shown on screen exactly as they would appear on the final printout. Also left, centred and right justified text is shown on screen as you edit. What you see on screen is really what you get on the printout.

### •On screen page breaks

You need never lose your place on the page. Top and bottom spaces, with any associated headings, footings or page numbers etc. are shown at all times. Like most features in INTER-WORD, a menu option lets you turn paging off.



### •Integrated spelling checker

To be made available soon, this entirely ROM based spelling checker allows text to be checked as it is typed or after typing, at over 9000 words per minute.

### •40,53,80 and 106 column screen modes

### •Mail merge

### •Integrates with all other parts of INTER family

### •Automatic page numbering, with headers and footers

### •Very fast and smooth scrolling

### •Powerful search and replace facilities including wildcards, upper/lower case sensitivity, stored search and replace strings for instant re-use.

### •Automatic word count

### •Fast simple cursor movement to any point

### •Easily tailored to any printer

### •Line numbering

### •Selectable screen colours

### •Compatible with the B, B+ and Master; Solidisk, Aries and Watford shadow RAM boards.

Software is now more important than the hardware, especially with today's falling hardware prices.

INTER-WORD is the most sophisticated and professional word processing package available for the BBC Microcomputer.





# Synergy Software

## Professional Software for the BBC Micro

### SHAREMASTER \*\*\* New \*\*\*

ShareMaster is the ultimate integrated investment analyst and reporting system for the BBC Micro.

Designed for the small and professional investor, ShareMaster is the most powerful tool available for predicting the mood and direction of the stockmarket and analysing investment performance. ShareMaster can analyse share prices, currencies, traded options, commodities or any other time based series by a variety of comparative, statistical and analytical measures.

Price information can be entered on a daily or weekly basis and the package supports full date and decimal handling.

Charting facilities include log/lin graphs, point & figure, linear regression, exponential curve smoothing, correlation, six types of comparison, momentum, RSI oscillators, moving averages, highs, lows, trendlines, two size Epson compatible screendumps etc.

Profit Analysis facilities include Valuation, Performance, Share and Portfolio Profit analyses etc.

Numerical analysis facilities include key charting indicators, Ratios and general price statistics for any chosen price range.

ShareMaster has extensive reporting, database and file management features including Company Profile, transaction reporting, file import & full editing facilities.

We believe that NO investment package can match ShareMaster in terms of facilities, performance, flexibility, ease of use and price. Ask for our FREE detailed brochure. An investment at **£99.95**. Also available for Amstrad PCW.

### SHARE ANALYSER

*'excellent... very highly recommended'* - Which? Software Guide  
*'an excellent program'* - Micro User

Share Analyser is an easy to use reporting, analysis and charting package capable of maintaining Transaction and Share Price Databases and providing access to a variety of report and analysis facilities.

Charting facilities include Moving Averages, Rise & Fall, Overlay etc.  
**Superb value at £24.95**



## BIOGRAM

*'Biogram provides the user with a very cheap near equivalent to a professional system costing many times its purchase price'* A&B Computing. *'ingenious package...'* Acorn User *'good value for money'* Micro User.

Biogram is an electronic stress management system designed to teach self awareness and relaxation techniques.

The Biogram software has extensive facilities for relaxation training, lie detection and phobia reduction and includes an electronic biofeedback detection module.

## RAPID READER

*'Synergy's previous programs have been characterised by originality, practical application and high quality of program design and documentation. There is every indication that Rapid Reader lives up to this high standard'* A&B Computing.

Rapid Reader is a powerful and flexible reading improvement package incorporating a self contained, 48 lesson speed reading training course.

## ORDER FORM

(State 40 or 80 track disk). Orders despatched within 24 hrs.  
Prices include VAT and first class p&p. Overseas orders send full price for airmail despatch.  
Cheque, Access, Visa and official educational orders accepted.  
Dealer enquiries welcome.  
**DETAILED CATALOGUE SUPPLIED ON REQUEST.**

ShareMaster BBC B, B+ Master (disk) .....	<b>£99.95</b>
Share Analyser BBC, B+ & Master (disk) .....	<b>£24.95</b>
Share Analyser (cassette) .....	<b>£17.95</b>
Biogram BBC B, B+ & Master (disk & cassette) .....	<b>£49.95</b>
Rapid Reader BBC B, B+ & Master (disk only) .....	<b>£27.95</b>

Send cheque, P.O. to: **Synergy Software Dept AU**  
**7 Hillside Road,**  
**Harpenden, Herts AL5 4BS. (05827 2977).**

# Have a word with your micro for just £149\* + VAT

## Microcomputer Voice Control at a Sensible Price

R&D Speech Technology's MICRO-VOICE is the definitive speech input/output device for your BBC microcomputer. For just £149 plus VAT, it delivers full vocal control of your system, freeing processor time, and saving you the bother of typing in commands.

### The Micro-Voice

- Understands up to ten words or phrases at any one time.
- Listens in any language.
- Is simple to install and simple to operate.
- Can be quickly and easily incorporated into any program.
- Comes with detailed operating instructions and training.
- Is totally reliable and achieves up to 95% accuracy.

*\*Includes microphone and stand.*  
*System in photograph includes optional headset for £25.00 (+VAT)*



**To: R & D Speech Technology**  
**Waterside House**  
**Pons Harden, Penryn**  
**Cornwall, TR10 8AR**

Tick the Boxes for the Items Required

- ☐ Please supply MICRO-VOICE(S) at £176.35 (inc. VAT and P&P)
- ☐ Please supply ..... BBC Model B 3-way 1MHz bus connectors at £17.99

Name .....

Address .....

Post Code .....



# Computers by Post

## LOWEST U.K. PRICES GUARANTEED



### PRINTER RIBBONS

		2+	5+	12+
ACORN	AP80	£2.95	£2.40	£2.30
	AP100	£2.95	£2.40	£2.30
AMSTRAD	DMP1	£3.90	£3.30	£3.10
	DMP2000	£4.60	£4.30	£4.20
BROTHER	PCW8256/8512	£4.60	£4.30	£4.20
	HR5	£3.00	£2.80	£2.60
BROTHER	HR15 Corr	£2.90	£2.50	£2.30
	HR15 FAB	£3.60	£3.10	£2.90
BROTHER	HR15 MS	£3.50	£3.00	£2.80
	HR15 also for HR25/HR35			
CANON	EP44	£2.90	£2.50	£2.30
	M1009	£3.70	£3.20	£3.00
CANON	PW1080A Black	£3.40	£2.90	£2.70
	PW1080A Red or Blue	£5.30	£4.70	£4.40
CANON	PJ1080 Ink Jet Colour. One Off			£10.90
	PJ1080 Ink Jet Black. One Off			£8.90
CBM	1515	£2.95	£2.40	£2.30
	1525	£2.95	£2.40	£2.30
CBM	MPS801	£3.90	£3.30	£3.10
	802/1526	£4.00	£3.20	£3.00
CBM	803	£3.70	£3.20	£3.00
	MPS1000	£3.00	£2.60	£2.40
CBM	4022	£3.00	£2.60	£2.40
	MSC801 Colour. One Off			£18.50
CENTRONICS	DPS1101 SS	£1.60	£1.30	£1.20
	DPS1101 MS	£2.50	£2.10	£2.00
CENTRONICS	DPS1101 Corr	£1.80	£1.50	£1.40
	GLP	£3.70	£3.20	£3.00
CITIZEN	120D	£5.00	£4.60	£4.30
	2000 MS	£3.10	£2.60	£2.40
DAISYSTEP	2000 FAB	£4.90	£4.20	£4.00
	MX/FX/RX80 Black	£3.00	£2.60	£2.40
EPSON	MX/FX/RX80 Red or Blue	£4.20	£3.50	£3.30
	100 Series	£5.00	£4.60	£4.30
EPSON	LX80	£3.00	£2.60	£2.40
	JX80 Colour. One Off			£18.50
JUKI	LQ800	£3.90	£3.50	£3.30
	LQ1500	£4.50	£3.90	£3.60
JUKI	6000/2200 FAB	£3.70	£3.40	£3.20
	6000/2200 Corr	£4.00	£3.60	£3.40
JUKI	6000/2200 SS	£3.10	£2.70	£2.50
	6100 MS	£2.50	£2.10	£2.00
KAGA	6100 SS	£1.60	£1.30	£1.20
	6100 Corr	£1.80	£1.50	£1.40
KAGA	KP810 Black	£3.40	£2.90	£2.70
	KP810 Red or Blue	£5.30	£4.70	£4.40
M/TALLY	MT80	£4.00	£3.20	£3.00
	80/82	£1.60	£1.30	£1.20
OKI	84	£3.90	£3.40	£3.20
	Mate 20 Colour	£7.00	£6.50	£6.20
PANASONIC	Mate 20 Black	£6.60	£6.20	£6.00
	KX1091/2	£5.00	£4.60	£4.30
QUENDATA	DWP1120 MS	£3.10	£2.60	£2.40
	DWP1120 FAB	£4.90	£4.20	£4.00

QUME	Sprint 7/9 MS	£3.10	£2.60	£2.40
	Sprint 7/9 FAB	£4.90	£4.20	£4.00
SEIKOSHA	GP50	£6.00	£5.50	£5.20
	GP80	£2.95	£2.40	£2.30
SHINWA	GP100/250	£2.95	£2.40	£2.30
	GP500/550	£3.90	£3.30	£3.10
SMITH	GP700 Colour. One Off			£18.50
	SP1000	£6.00	£5.50	£5.20
CORONA	CP80	£4.00	£3.20	£3.00
	TPI M/S	£8.50	£7.90	£7.20
STAR	TPI Fabric	£3.90	£3.60	£3.40
	TPI Corr	£5.00	£4.70	£4.50
STAR	Fastex 80X	£6.00	£5.50	£5.30
	D100/200	£9.00	£8.50	£8.20
STAR	D300	£6.00	£5.50	£5.30
	DP/GEM/SG	£1.60	£1.30	£1.20
STAR	SR15	£4.90	£4.50	£4.30
	NL10	£5.60	£4.90	£4.60

### FLOPPY DISKS

5 1/4"	JVC inc Plastic Case	1-2	3-9	10+
MD-1D	S/D side D/dens 40TR	£9.99	£9.50	£9.25
MD-2D	D/D side D/dens 40TR	£11.99	£11.50	£11.25
MD-2DD	D/D side Q/dens 80TR	£15.99	£15.50	£15.25
MD-2HD	D/D side H/dens 1.6MB	£26.99	£25.99	£25.49
BASF	1D	£10.99	£10.50	£10.25
	2D	£12.99	£12.50	£12.25
VERBATIM	1D/96	£13.49	£12.99	£12.49
	2D/96	£16.49	£15.99	£15.49
DATELINE	2HD	£28.49	£27.49	£26.49
	MD525	£11.99	£11.75	£11.49
SONY	MD550	£14.99	£14.75	£14.49
	MD577	£14.99	£14.75	£14.49
SONY	MD557	£19.99	£18.99	£18.50
	MD HD	£27.99	£26.99	£25.99
3 1/2"	S/D side D/dens	£12.49	£11.99	£11.75
	S/D side D/dens	£15.49	£14.99	£14.75
3 1/2"	D/D side D/dens	£20.49	£19.99	£19.75
	D/D side Q/dens 80TR			
3 1/2"	S/D side D/dens	£18.99	£18.25	£17.99
	S/D side D/dens	£19.99	£19.25	£18.99
3 1/2"	D/D side D/dens	£31.50	£30.50	£28.99
	D/D side D/dens			
BULK 3 1/2"	5 x Disks	£3.13 each	£15.65 pack	
	10 x Disks	£2.50 each	£25.00 pack	
3 1/2"	20 x Disks	£2.08 each	£41.60 pack	
	CF2 5 Disks	£3.49 each	£17.45 pack	
3 1/2"	CF2 10 Disks inc plastic library case	£3.05 each	£30.50 pack	
	CF2DD 5 Disks	£6.10 each	£30.50 pack	
3 1/2"	CF2DD 10 Disks inc plastic library case	£5.25 each	£52.50 pack	

### DISK STORAGE

LOCKABLE DISK BOXES	MODEL	SIZE	CAPACITY	PRICE
LOCKABLE DISK BOXES	DD40L	3 1/2"	40	£8.90
	MD60T	3 1/2"	60	£12.50
LOCKABLE DISK BOXES	DD50	5 1/4"	50	£8.90
	DD70	5 1/4"	70	£10.90
LOCKABLE DISK BOXES	DX85	5 1/4"	90	£12.90
	DD100	5 1/4"	100	£13.90
LOCKABLE DISK BOXES	LIBRARY CASE	5 1/4"	10	£1.50
NON-LOCKABLE DISK BOXES	MD12/30	3 1/2"	24	£7.20
	MF50	5 1/4"	50	£8.00
MICRODRIVE HOLDERS	WALLET		4	£1.75
	WALLET		20	£4.50

### PRINTER CABLES & INTERFACES

AMSTRAD	Parallel	£8.90
ATARI ST	Parallel	£14.50
BBC	Parallel	£6.50
IBM	Parallel	£14.50
MSX	Parallel	£10.90
CBM 64/128	Parallel I/F	£59.90
SINCLAIR QL/SPEC 128	Parallel I/F	£26.50
SINCLAIR SPECTRUM	Parallel I/F	£32.50
AMSTRAD PCW	Parallel/Serial I/F	£49.90

### COMPUTER STATIONERY

PLAIN WHITE WITH MICRO-PERF EDGES	SIZE	GSM	QUANTITY	1 BOX	2 BOXES
PLAIN WHITE WITH MICRO-PERF EDGES	11 x 9 1/2	60	2000	£12.90	£12.00
	11 x 9 1/2	80	2000	£15.90	£14.50
PLAIN WHITE WITH MICRO-PERF EDGES	EXACT A4	70	2000	£21.50	£18.75
	11 1/2 x 9 1/2	90	1000	£13.50	£11.25

### COMPUTER LABELS

PRICE PER THOUSAND	1000	2000+
70 x 36mm	£4.40	£4.00
89 x 36mm	£4.50	£4.10
89 x 49mm	£6.20	£5.70
102 x 36mm	£4.70	£4.40

Please state number of labels across sheets (1, 2 or 3).

### ENVELOPES

PRICE PER BOXED BOX	BOXED	BOX
110mm x 220mm White Self Seal 90gsm	500	£11.50
	500	£9.50
110mm x 220mm Manilla Banker Gummed 70gsm	500	£9.50
	250	£17.90

PRINTERS	Star SD15	£429.95
Epson LX80	Star SR15	£479.95
Epson LX86	Juki 6100	£249.95
Epson FX85		
Epson FX105		
Epson EX800		
Epson LQ800		
Epson LQ1000		
Epson JX80 colour		
Citizen 120D		
Amstrad DMP2000		
Brother 1509		
Ok-mate 20 Colour		
Micra P MP165		
Seikosha SP1000A		
Seikosha MP1300A		
Star NL10 inc I/F		
Star SG15		
Star SG10		

### COMPUTERS

Acorn BBC Master	£419.95
Amstrad PCW8256	£389.95
Amstrad PCW8512	£489.95
Amstrad CPC464 Colour	£169.95
Amstrad CPC6128 Colour	£254.95
Atari 520ST ROM	£254.95
Atari 520STM	£339.95
Atari 1040STF + mono mon.	£269.95
Atari 1040STF + col. mon.	£279.95
Commodore C64	£685.95
Commodore C64C	£799.95
Commodore C128 + cass.	£139.95
	P.O.A.
	£209.95

### NEW AMSTRAD PC (IBM compatible)

Send for our special price list

### MONITORS

Philips CM8501	£205.95
Philips CM8524	£229.95
Philips CM8533	£265.95
Philips BM7502 Green	£79.95
Philips BM7522 Amber	£85.95
Philips BM7542 White	£89.95
Philips BM7513 IBM	£105.95

### SOFTWARE

View	£33.95	Datagem	£59.95
View 3.0	£51.95	Home accounts cassette	£16.95
View Store	£33.95	Home accounts disk	£19.95
View Sheet	£33.95	DDD Base	£24.95
View Print driver	£7.95	DDD Calc.	£24.95
Wordwise plus	£39.95	DDD Plot	£24.95
Intersheet	£39.95	Combo DDD	£55.95
Interword	£39.95	Office Mate Disk	£10.95
Interchart	£26.95	Office Master Disk	£20.95
Print master	£23.95	AMX Mouse + Superart	£65.95
Caretaker	£23.95	AMX Pagemaker	£41.95
Graphics ROM	£23.95	AMX Desk	£19.95
Communicator	£43.95	AMX Super art	£41.95
Mini Office II Cass.	£12.95	AMX Database	£19.95
Mini Office II Disk 40TR	£14.50	Fleet Street Editor 40TR	£34.95
		Fleet Street Editor 80TR	£34.95

### DELIVERY

Hardware £5 + VAT 4 Day Delivery  
ALL CONSUMABLES AND SOFTWARE POST FREE £9 + VAT 24 Hour Delivery

**GALASET GUARANTEE** If after buying any of the hardware or software in this advertisement, you find the same item offered at a lower price locally within one week, Galaset will refund the difference.

All prices exclude VAT  
**CREDIT CARD HOT-LINE**

**01-760 0014**

**Galaset Ltd, 30 Bayford Road, Littlehampton, West Sussex.**

### Export Enquiries Welcome

To: Galaset Ltd, 30 Bayford Road, Littlehampton, West Sussex.  
I wish to order: \_\_\_\_\_

I enclose cheque/PO for £ \_\_\_\_\_ inc VAT  
or charge my Access/Visa No: \_\_\_\_\_

Name \_\_\_\_\_  
Signature \_\_\_\_\_  
Address \_\_\_\_\_

Postcode \_\_\_\_\_ Tel No: \_\_\_\_\_



LEADING  
SUPPLIER TO THE  
BBC MARKET  
ESTABLISHED OVER 15 YEARS

# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177  
305 Edgware Road, London W2 Tel: 01-723 0233

## BBC MASTER SERIES

### AMB15 MASTER

Foundation 128K. £395 (a)

### AMB12 MASTER ET

(ANFS only) 128K £319 (a)

AMC06 Turbo 65C02 Module £105 (b)

ADC08 512 Processor £345 (b)

ADF13 ROM Cartridge £13 (d) ADJ23 Ref Manual

ADF10 Econet Module £43 (c) Part II £14.95 (c)

ADJ22 Ref Manual ADJ24 Adv

Part I £14.95 (c) Ref Manual £19.50 (c)

BBC MASTER View User Guide £10 (d)

Dust Cover £4.75 (d) Viewsheet User Guide £10 (d)

## BBC MASTER COMPACT

See page 5 for details

### SYSTEM 1

128K, Single 640K Drive & bundled software. £399 (a)

### SYSTEM 2

System 1 with a 12" Med Res RGB Monitor. £469 (a)

### SYSTEM 3

System 1 with a 14" Med Res RGB Monitor. £599 (a)

Second Drive Kit. £99 (c)

## UPGRADE KITS

1.2 OS ROM £15 (d) 8271 DFS Kit £80 (d)

DNFS ROM £17.50 (d) 1770 DFS Kit £43.50 (d)

BASIC II ROM £22.50 (d) Econet Kit £55 (d)

ADFS ROM £26 (d) 64K Upgrade Kit for B+ £35 (d)

## ECONET ACCESSORIES

Econet Starter Kit £85 (b) Econet Bridge £174 (b)

Econet Socket Set £29 (c) Printer Server Rom £41 (d)

File Server Level II £120 (b) 10 Station Lead Set £26 (d)

Ad Econet User Guide £10 (d) Econet Manager's Guide £10 (d)

## 32016 CO PROCESSOR

For full specification see page 5 £1,130 (a)

## CAMBRIDGE W/STATION

For full specification see page 5 £3,450 (a)

## WINCHESTER DRIVES

Acorn Winchesters complete with File Server Level III and ADFS hierarchical filing system. Data transfer rate of 1Mbit/sec and average seek time of 85ms providing very fast access times.

Acorn 30 Mbyte Winchester £1,599 (a)

See Disc Drive Section for Technomatic's Winchester range.

## SECOND PROCESSORS

### ACORN Z80 2nd Processor

with 64K RAM, CP/M operating system. Comprehensive package of bundled business software. £329 (a)

### ACORN 6502 2nd Processor

with second 6502 and 64K RAM provides faster data processing speeds and larger user RAM. £179 (b)

### TORCH ZEP 100

Z80 cpu with 64K RAM and TORCH's CP/M compatible MCP operating system. With FREE bundled software. Fits internally in the computer. £229 (b)

### TORCH TZDP240

Torch ZEP100 with TECHNO-MATIC's dual drive with monitor stand PD800P. £439 (a)

### MULTIFORM Z80

TECHNOMATICS multi format Z80 system. Details on page no 7 includes free POCKET WORDSTAR. £299 (b)

MS/DOS Read/Write Utility £49 (d)

## ACORN IEEE INTERFACE

Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs. £269 (a)

## TELETEXT ADAPTOR

Converts your computer into a teletext receiver. £125 (b)

## ROBOCOM BITSTICK

BITSTICK I £299 (a)

BITSTICK II £775 (a)

Upgrade for Bitstick I to II £415 (a)

Bitstick I Multiplotter Driver £79 (c)

(includes most popular plotters)

Epson FX80 Dump for Bitstick I/II £25 (d)

## PRINTERS

### EPSON LX86

120 cps, variety of fonts including NLQ, bit image graphics, IBM char/graphics compatible, centronics interface standard. £229 (a)

EPSON LX80/86 Tractor Feed £20 (c)

EPSON LX80/86 Sheet Feeder £49 (c)

### EPSON FX85

160cps, 80 col, 80K buffer, NLQ, IBM compatible graphics Variety of fonts, multiple density bit image mode. £315 (a)

### EPSON FX105

As FX85 but with wide carriage for 136 col £449 (a)

### EPSON LQ800

See specification on page 5 £459 (a)

### EPSON LQ1000

As LQ800 but wider carriage for 136 columns £659 (a)

### TAXAN KP810

140 cps, 80 col, NLQ, 2K buffer, variety of fonts, quad density hi res bit image graphics, centronics interface standard £219 (a)

### TAXAN KP910

As KP810 but with wide carriage for 156 col £369 (a)

### NATIONAL PANASONIC KX P1080

See specification on page 5. £159 (a)

STAR NL 10 (Parallel Interface) £239 (a)

STAR NL 10 (Serial Interface) £279 (a)

See specification on page 5.

EPSON JX80 colour printer £420 (a)

INTEGREX Multicolour Inkjet printer £549 (a)

CANON PJ1080A printer £409 (a)

4 Colours.

### BROTHER HR15 Daisy wheel printer

14 cps, 3K buffer, proportional spacing, underline, bold, shadow print, super/sub script, two colour print, parallel interface. £299 (a)

### JUKI 6100 Daisy wheel printer

15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface. £249 (a)

## PLOTTERS

See details on page 5.

EPSON HI 80 PLOTTER £325 (a)

HITACHI 672 PLOTTER £454 (a)

GRAPHICS WORKSTATION £609 (a)

### LINEAR GRAPHICS

A4 PLOTMATE £224 (a)

A4M PLOTMATE £299 (a)

A3M PLOTMATE £426 (a)

## PRINTER SHARERS & BUFFERS

### BUFFALO 32K

32K parallel buffer for internal fitting to most EPSON/Epson compatible printers. £75 (c)

### TECHNO SHARER BUFFER

A unique sharer/buffer connects upto 3 computers to a single printer with auto scan and switching to computer outputting the data. Printer PAUSE, COPY and CLEAR facility. Mains powered, two buffer sizes 64K & 256K

TSB 64 £199 (b)

TSB 256 £275 (b)

### PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases, all lines fully switched.

	Parallel	Serial
3 Computers to 1 Printer 36v36-3	£69 (c)	25v25-3 £65(c)
4 Computers to 1 Printer 36v36-4	£85 (c)	25v25-4 £75(c)
2 computers/2 Printers X-over 36v36-x	£69 (c)	25v25-x £65(c)
BBC Cable set 3 to 1 (1m ea)	£32 (d)	£34(c)
BBC Cable set 4 to 1 (1m ea)	£39 (d)	£41(c)

### BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable £22.00 (c)



**BBC Computer  
& Econet  
Referral Centre**

**MAIL ORDER**  
17 Burnley Road  
London NW10 1ED  
Telex: 922800

**RETAIL SHOPS**  
15 Burnley Road, London NW10 1ED  
Tel: 01-208 1177 Telex: 922800  
(close to Dollis Hill ☺)

**West End Branch**  
305 Edgware Road, London W2  
Tel: 01-723 0233  
(near Edgware Road ☺)

For fast delivery telephone  
your order on 01-208 1177  
using VISA/Access Card



Orders welcome from  
government depts &  
educational establishments.

All prices ex VAT.  
Prices are subject  
to change without notice.

Please add carriage  
(a) £8.50 (Datapost)  
(b) £2.50  
(c) £1.50  
(d) £1.00

## DISC DRIVES

Full details on page 6.

**5.25" Single Drives 40/50 switchable:**  
TS400 400K/640K **£103 (b)**

PS400 400K/640K with integral  
mains power supply **£114 (b)**

**5.25" Dual Drives 0/80 switchable:**

TD800 800K/128OK **£205 (a)**

PD800 800K/128OK with  
integral mains power supply **£229 (a)**

PD800P 800K/128OK with  
integral mainspower supply and  
monitor stand **£249 (a)**

## WINCHESTER DRIVES

P20 HD 20 Mbyte Hard Disc with  
ADFS Rom **£669 (a)**

P204HP 20 Mbyte Hard Disc, 80T DS  
floppy in a monitor stand plus ADFS  
Rom **£865 (a)**

P2041HT As P204HP and a 10 Mbyte  
tape streamer, with backup utilities  
plus ADFS Rom **£1579 (a)**

**3.5" 80T DS Drives:**  
TS351 single 400K/640K **£99 (b)**

PS351 single 400K/640K with  
integral mains power supply **£299 (b)**

TD352 Dual 800K/128OK **£155 (b)**

PD352 Dual 800K/128OK with  
integral mains power supply **£169 (b)**

## DISC DRIVE MULTIPLEXER

Full specification on page 6.

**TDM2**  
Dual Unit: 2 computers/one drive unit **£75 (b)**

**TDM4**  
Quad Unit: 4 computers/one drive unit **£135 (b)**

## 3M FLOPPY DISCS

**5.25" Discs in packs of 10**  
744 40T SS DD 4 **£10.50 (d)**

745 40T DS DD 3 **£12.75 (d)**

746 80T SS DD 3 **£16.50 (d)**

747 80T DS DD 3 **£16.50 (d)**

(Add £1 for library case packing)

**3.5" Discs in packs of 10**  
80T SS DD 3 **£20 (d)**

80T DS DD 2 **£27 (d)**

The number in green is the  
qualifying number for a free SWISS  
ARMY KNIFE while stocks last.

**FLOPPICLENE DRIVE HEAD  
CLEANING KIT**

5.25" Kit with 20 disposable discs **£12.50 (d)**

3.5" Kit with 20 disposable discs **£14.00 (d)**

## DISC STORAGE BOXES

DB530 Non Lockable 30 x 5.25" **£6.00 (c)**

DB340 Lockable 40 x 3.5" **£8.50 (c)**

DB550 Lockable 50 x 5.25" **£9.50 (c)**

DB570 Lockable 70 x 5.25" **£11.00 (c)**

DB5100 Lockable 100 x 5.25" **£13.00 (c)**

## MONITORS

BBC lead incl with all monitors

**MICROVITEC 14" RGB Monitors**  
Please specify plastic or metal case.

**Microvitec 1431**  
Standard Resolution 453 pixels **£179 (a)**

**Microvitec 1431AP**  
As 1431 + composite video and sound  
input **£195 (a)**

**Microvitec 1451**  
Medium Resolution 653 pixels **£225 (a)**

**Microvitec 1451AP**  
As 1451 + composite video and sound  
input **£260 (a)**

**Microvitec 1441**  
High Resolution 895 pixels **£365 (a)**

**Microvitec 20" RGB/PAL/  
Audio Monitors**

**Microvitec 2030CS**  
Standard Resolution RGB/Comp  
Video **£380 (a)**

**Microvitec 2040CS**  
High Resolution RGB/Comp Video **£685 (a)**

**TOUCHTEC-501**  
Brings genuine touch screen operation  
on metal cased Microvitec monitors,  
incl utilities disc with starter and  
development programs **£239 (b)**

**TAXAN SUPER VISION II**  
12" Hi Res/Hi Contrast  
Option to switch to green/amber  
BBC/IBM Compatible **£279 (a)**

**MITSUBISHI XC1404**  
14" Med Res RGB Monitor  
Etched dark screen brilliance and  
contrast control, BBC/IBM  
compatible **£229 (a)**

## 12" MONOCHROME MONITORS

**TAXAN KX1201G**  
Hi Res green etched screen **£90 (a)**

**TAXAN KX1202G**  
Hi Res Long Persistence (P39) **£98 (a)**

**TAXAN KX1203A**  
Hi Res amber etched screen **£98 (a)**

**PHILIPS BM 7502**  
Hi Res green screen **£75 (a)**

**PHILIPS BM7522**  
Hi Res amber screen **£79 (a)**

**HANTAREX HX12** **£69 (a)**

## MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic  
monitors) **£20 (c)**  
Philips Swivel Base **£14 (c)**  
Monitor Stand Models B & B+ **£10 (c)**  
Monitor Stand Master **£13 (c)**

Double Tier stand Models B, B+ or  
Master **£24 (b)**

Taxan RGB Lead **£5 (d)**

Microvitec Lead **£3.50 (d)**

Monochrome BNC/Phono Lead **£3.50 (d)**

## RAM/ROM EXPANSION

**ATPL Board** for Model B. Simple  
to instal, no soldering. Allows  
expansion to 15 Roms + 2 8K Rams **£37 (b)**

ATPL Battery backup kit **£18 (b)**

**RAMROM 15** for Model B.  
External board in an attractive case —  
easy access to sockets. 6502 Processor  
signals for development work. **£79 (b)**

**Low Profile Cartridge Module**  
Module + 1 cartridge **£12 (d)**

Spare Cartridge **£2.50 (d)**

Cartridge rack **£1.50 (d)**

## TIME WARP

Real Time Clock. Plugs into the user  
port, battery back up as standard,  
includes manual, demo software  
including a diary/planner application  
program **£29 (d)**

## MODEMS

(All modems are BABT approved)  
See page 7 for modem specifications

**MIRACLE WS2000V21/23 &  
BELL stds** **£102 (c)**  
WS2000 Auto Dial Card **£26 (d)**  
WS2000 Auto Answer Card **£26 (d)**  
WS2000 SK1 Kit **£5 (d)**  
WS2000 DS1 disc **£10 (d)**  
WS2000 Data Cable for BBC **£6 (d)**

**MIRACLE WS4000 V21/23** **£149 (b)**

**MIRACLE WS3000 V21/23** **£295 (b)**

**MIRACLE WS3000 V22** **£495 (b)**

**MIRACLE WS3000 V22 bis** **£650 (b)**

BBC Data Cable for WS3000 **£7 (d)**

**GEC DATACHAT Modem V23**  
1200/75, 75/1200 & 1200/1200 pseudo  
f.d. line powered, complete with  
software suitable for connecting to  
Prestel, Micronet, Telecom Gold and  
many bbs. Special offer price **£49 (b)**

## PROGRAMMING ACCESSORIES/SOFTWARE

see page 8 for detailed specification

Compatible with B, B+ and Master

**EPROMER II** with disc based  
software and rom image **£99 (b)**

**META ASSEMBLER** **£145 (b)**

**PORTAL EPROM  
EMULATOR 256K** **£185 (b)**

**PORTAL EPROM  
EMULATOR 512K** **£285 (b)**

**EPROM ERASERS**  
UV1B 6 eproms, safety cutout **£47 (b)**

UV1T 6 eproms, timer, safety cutout **£59 (b)**

## CAD/DRAWING PACKAGES

**NOVACAD CAD** Package for B,  
B+ & MASTER (See page 9 for  
specification)

**BASIC Version** **£79 (d)**

**Tracker Ball/Mouse Version (TM)** **£99 (d)**

**TM Version plus Tracker Ball** **£129 (c)**

**TM Version plus Mouse** **£115 (c)**

**Plotter Driver Generator** **£28 (d)**



# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

305 Edgware Road, London W2 Tel: 01-723 0233

## MOUSE

**AMX MOUSE with SUPER ART** £67 (d)  
(pse specify B, B+ or Master)

**Super Art** £43 (d)  
**PAGEMAKER** £43 (d)  
**3D ZICON** £21 (d)  
**PAINTPOT** £21 (d)  
**DATABASE** £21 (d)

**RB2 TRACKER BALL**  
RB2 Tracker Ball with Icon Master  
(for B, B+ & Master) £59 (c)

RB2 Tracker Ball with Cursor Control  
Rom £59 (c)  
(for Master only)

RB2 Tracker Ball 'Stand Alone'  
for use with NOVACAD & other  
software) £47 (c)

Cursor Control Rom for Master £12.50 (d)

**MIRRORSOFT FLEET  
STREET EDITOR** incl VAT £39.50 (d)

## SOFTWARE CP/M SOFTWARE

for Acorn, Torch & Multiform  
Z80 Processors

**MICROPRO's Wordstar Professional** £310 (a)

**ASHTON TATE's DBASE II** £310 (a)

**SUPERCALC II** £195 (a)

Send for details on our full range of  
CP/M & PC DOS packages for  
Business, Communications & High  
Level Languages.

## BBC SOFTWARE/ FIRMWARE

### DATABASE MANAGEMENT SYSTEMS

#### VIEWSTORE

Acorn's database with display in any  
mode in spreadsheet or user defined  
card format and powerful sort  
facilities. Max file size 4Mb

£37 (d)

#### STARdataBASE

A fast machine code, true random  
access database. Upto 4000  
records/file, 69 fields. Fully menu  
driven, user defined record layout, very  
fast searches thru keysearch facility.  
Mailmerging from VIEW and WW.

£49 (d)

#### MASTERFILE II

Highly popular economically priced  
database. 17 fields per record, file size  
limited by drive capacity only. (40T or  
80T)

£17 (d)

#### GEMINI's DATAGEM

A 24K database system offering large  
user defined record layout, multi level  
searches etc

£59 (c)

### WORD PROCESSORS

#### VIEW 2.1

£37 (d)

#### VIEW 3.0

New version of VIEW compatible with  
B+ complete with a printer driver  
generator.

£56 (c)

#### HI-VIEW

Disc based version of VIEW 2.1 for use  
with 6502 2nd processor allowing upto  
47K of memory for text.

£36 (d)

## VIEWSPELL

Acorn's new rom based spelling  
checking utility with a 70,000 word  
dictionary on 80T disc.  
Additional/specialised dictionaries can  
be created. Facilities also include wild  
card search for words.

£29 (d)

## VIEW INDEX

£12 (d)

## VIEW PRINTER DRIVER GENERATOR

A utility to generate a View printer  
driver to suit any printer. Screen driver  
allows viewing of text exactly as it will  
appear on paper.

£9 (d)

## DOT PRINT PLUS

Full details on page 5 NLQ rom for  
Epson FX/RX, MX and GLP.

£28 (d)

## WORDWISE

£24 (d)

## WORDWISE PLUS

£38 (d)

## INTERWORD

(If you own a WW+ then quote your  
reg number and pay £10 less).

£49 (d)

## WORDEASE

A 16K rom based utility for WW +

£24 (d)

## SPELLCHECK III

A 16K rom based spellcheck program  
for View and WW. Contains 2000  
words on the rom and 6000  
(expandable to 17000) words on a disc.

£31 (d)

## EDWORD II

£43 (c)

### SPREADSHEETS

#### VIEW SHEET

Acorn's spreadsheet provides 255 cols  
and 255 rows and will operate in any  
mode. Fully compatible with VIEW  
and 6502 2nd processor.

£37 (d)

#### VIEWPLOT

A disc based plotting program. (To be  
released soon).

£22 (d)

#### INTERSHEET

The new spreadsheet from Computer  
Concepts with many advanced features  
like 105 col mode, holding several  
spreadsheets in memory at a time etc.

£39 (d)

#### INTERCHART

Graphics package for Intersheet

£27 (d)

#### ULTRACALC

BBC Publications very popular and  
well proven spreadsheet rom includes  
graphics utility disc.

£52 (d)

#### QUICKCALC

A disc based economically priced  
spreadsheet package (40 or 80T Disc).

£14.50 (d)

#### MINI OFFICE II

A suite of inexpensive but extensive  
word processor, database and  
spreadsheet packages. (40T or 80T)

£14.75 (d)

### LANGUAGES

#### META ASSEMBLER

Multi processor Assembler full details  
on page 8

£145 (c)

#### ACORN 6502 DEV. PACKAGE

A macro assembler with utilities for  
developing large programs in assy lang.  
Requires 6502 2nd processor.

£43 (d)

#### MACROM

A very fast full featured macro  
assembler rom from 6502 and 65C02  
codes, allows use of macros from  
library disc. Assembly can be disc to  
memory, memory to memory, memory  
to disc and disc to disc thus allowing  
very long source code upto the length  
of disc in use. About 3 times as fast as  
ADE and 30% more economical in  
memory.

£33 (d)

#### ACORN MICRO PROLOG

Logic programming language used  
extensively in the artificial intelligence  
field. A simple 'front end' is supplied  
to make syntax more friendly.

£62 (d)

## ISO-PASCAL

Acorn's full implementation of  
International Std Pascal on 2x16K  
roms.

£48 (c)

## ISO PASCAL STAND ALONE GENERATOR

£30 (d)

## OXFORD PASCAL

A fast P-code compiler and stand alone  
utility (40 or 80T).

£36 (d)

## BCPL

£46 (c)

## BCPL CALCULATIONS

Supports floating point, fixed point  
and fast integer calculations on BCPL

£17.50 (d)

## BCPL STAND ALONE

### GENERATOR

£39 (d)

## ACORN LOGO

£46 (c)

## LOGOTRON LOGO

£55 (c)

## BBC PUBLICATIONS OPEN LOGO

£59 (c)

## ACORN LISP ROM

£39 (d)

## ACORN FORTH ROM

£39 (d)

## ACORN COMAL ROM

£43 (d)

## MICROTEXT

A frame based authoring system from  
NPL for interactive computer tutoring.  
Disc based

£52 (c)

## MICROTEXT PLUS

Extended Features incl extra memory,  
control of external devices etc. Rom  
based.

£229 (b)

### COMMUNICATIONS

#### TERMULATOR

Advanced terminal emulator which  
includes VT52/100, Tektronics 4010,  
teletype emulations.

£25 (d)

#### COMMSTAR

A highly popular communication rom  
suitable for all general purpose  
applications (specify B or Master)

£28 (d)

#### COMMUNICATOR

A full 80 col VT100 emulation program  
with easy to follow screen menus.

£49 (d)

#### DATABEEB

A variety of facilities for use with  
WS2000 Modem

£26 (d)

#### DS1 DISC

Special utilities for use with WS2000

£10 (d)

### UTILITIES

#### ACCELERATOR

£49 (d)

#### ACORN BASIC EDITOR

£22 (d)

#### MONITOR (BBC Pub)

£34 (a)

#### BROM PLUS

£26.50 (d)

#### SLEUTH

£23 (d)

#### TOOLKIT PLUS

£31 (d)

#### TOOLBOX 2 (BBC Pub) Manual Cassette

£9.50 (d)  
£9 (d)

#### EXMON II

£23 (d)

#### HELP II

£25 (d)

#### ACORN GXR GRAPHICS ROM specify B or B+

£22 (d)

#### PRINTMASTER

£24 (d)

#### DUMPMASER supports about 40 printers

£26 (d)

#### FONTWISE PLUS

£17 (d)

#### HERSHEY FONT CHARACTER GENERATOR

£18 (d)

#### ICON MASTER

£29 (d)

#### BILLBOARD

£18 (d)

#### STUDIO EIGHT

£19 (d)

#### MOVIE MAKER

Two Roms + Cassette

£26 (d)

#### CC SPEECH ROM

£28 (d)

#### CC SPEECH ROM to Text Rom

£34 (d)

#### ACORN SPEECH ROM

£15 (d)

#### ADV TELETEXT UTILITIES ROM

£7.95 (d)



BBC Computer  
& Econet  
Referral Centre

MAIL ORDER  
17 Burnley Road  
London NW10 1ED  
Telex: 922800

RETAIL SHOPS  
15 Burnley Road, London NW10 1ED  
Tel: 01-208 1177 Telex: 922800  
(close to Dollis Hill ☺)  
  
West End Branch  
305 Edgware Road, London W2  
Tel: 01-723 0233  
(near Edgware Road ☺)

For fast delivery telephone  
your order on 01-208 1177  
using VISA/Access Card



Orders welcome from  
government depts &  
educational establishments.

All prices ex VAT.  
Prices are subject  
to change without notice.  
  
Please add carriage  
(a) £8.50 (Datapost)  
(b) £2.50  
(c) £1.50  
(d) £1.00

**BBC PUBLICATIONS  
EDUCATIONAL SOFTWARE**

A series of programs developed in many cases alongside Radio & TV programs by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

**PRIMARY EDUCATION**

**ASTRONOMY:**  
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. **Disc £11 (d)**

**COMPUTERS AT WORK:**  
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. **Aud/EC/disc £16 (c)**

**PICTURE CRAFT**  
An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. **Disc £17 (d)**

**DRAWSTICK**  
8 year upwards for creating pictures, charts, maps etc. Pictures created can be used in your own programs. Sufficiently sophisticated for use by adults. **Cass £8 (d)**

**INTRODUCING GEOGRAPHY**  
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. **Disc £16 (d)**

**MATHS WITH A STORY 1**  
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. **Cass £8 (d)**

**MATHS WITH A STORY 2**  
Similar programs as 1 but covered from a different angle. **Cass £8 (d)**

**NUMBER GAMES:**  
6 programs designed to stimulate the mind of an active child of 8 years and upward. **Cass/EC £7.50(d)**

**USING YOUR COMPUTER**  
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. **Cass £24 (c)**

**WORD PLAY**  
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. **Cass £10 (d)**

**WORD MOVER**  
A simple text editor. **Cass £8 (d)**

**SECONDARY LEARNING**

**ADVANCED LEVEL**  
**STUDIES: STATISTICS**  
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution, Eont. Data & Normal Data Distribution, Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. **Disc £23 (d)**

**ADVANCED STUDIES: GEOGRAPHY**  
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. **Cass £10 (d)**

**INSIDE INFORMATION**  
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITes & Adult Educ. Centres. **Prog Cass £10 (d)**  
**Audio Cass £5 (d)**  
**Book £8 (d)**

**OPEN LOGO**  
Open University Logo incl two 16K roms and two manuals. **£55 (c)**

**SCIENCE TOPICS (ST)**  
**S.T.: WAVES**  
A Physics program allows display of waveforms and shows changes caused by different parameters. **Disc £14 (d)**

**S.T.: RELATIONSHIPS**  
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. **Disc £14 (d)**

**S.T.: BONDING**  
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. **Disc £14 (d)**

**S.T.: ELECTROMAGNETIC SPECTRUM**  
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. **Disc £14 (d)**

**S.T.: ELECTRONICS IN ACTION**  
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. **Disc £14 (d)**

**S.T.: NEWTON & THE SHUTTLE**  
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. **Disc £19 (d)**

**S.T.: ECOLOGY**  
Simulation program managing a nature reserve to meet a host of individual needs. **Disc/EC £19 (d)**

**S.T.: POLYMERS**  
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. **Disc/EC £19 (d)**

**S.T.: CLASSIFICATION & PERIODIC TABLE**  
A database program for producing different classifications of chemical information and presented in any format. **Disc £20 (d)**

**S.T.: FOOD & POPULATION**  
Simulation in space of biological aspects of nutrition and food production logistics. **Disc £20 (d)**

**SEC. SCIENCE: MICROTECHNOLOGY**  
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. **Cass £7 (d)**

**SEC. SCIENCE: THE MOLE CONCEPT**  
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. **Disc/Aud/EC £16 (c)**

**SEC. SC.: UNIFORMLY ACCELERATED MOTION:**  
Illustrates basic eqns., uniform accln, under gravity and an idea of terminal velocity. **Disc/AUD/EC £16 (d)**

**VU-TYPE**  
The popular 'Sight & Sound' touch typing tutor with alterable settings. **Disc/EC £15 (d)**

**GENERAL**

**GAME CORE**  
Provides information and intelligence routines for writing board games. **Cass £9 (d)**

**VU TYPE PROFESSIONAL**  
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. **Disc £19 (d)**

**WHITE KNIGHT MK II** **Disc £16 (d)**  
**BATTLEFIELDS** **Cass £8.50 (d)**

**A VOUS LA FRANCE**  
A home study aid for anyone learning French. **Cass/EC £12 (d)**  
**Book £5.25 (d)**

**DEUTSCH DIREKT**  
Disc based vocabulary learning prog with audio cassette to help with Disc/aud/EC **£16 (c)**  
pronunciation. **Book £5.95 (d)**

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per cassette, please specify the format required.

**PRINTER ACCESSORIES**

**EPSON ACCESSORIES:**  
**Interfaces:**  
8143 RS232.....£28 (d)  
8148 + RS232 + 8K.....£75 (d)  
8165 IEEE + Cable.....£65 (d)  
8148 RS232 + 2K.....£57 (d)  
8132 Apple II.....£60 (d)  
8177P NLQ for FX80 + /FX100 + .....£99 (d)  
Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment.....£37 (c)  
FX80/80 + Paper Roll Holder.....£17 (c)  
LX80 Tractor Feed.....£20 (c)  
LQ800 Tractor Feed.....£44 (b)

**SHEET FEEDERS:**  
8338 LX80.....£49 (b)  
8333 FX100 + /105.....£169 (a)  
8331 FX80 + /85.....£129 (b)  
8330 RX80 + .....£129 (b)  
LQ800.....£129 (d)

**Ribbons:**  
RX/FX100/100 + . FX105.....£10 (d)  
RX/FX80/80 + , FX85.....£5 (d)  
LX80.....£4.50 (d)  
LH80 Pen Set (Aqueous/Ball point).....£7.50 (d)

**Dust Covers:**  
FX80.....£5.50 (d)  
TAXAN/Canon KP810.....£6 (d)  
FX100.....£7.50 (d) KP910.....£7 (d)

**TAXAN CANON Accessories:**  
RS232 + 2K buffer.....£78 (d)  
Ribbon.....£6 (d)

**JUKI 6100**  
RS232 Interfaces.....£65 (d)  
Tractor Feed.....£129 (a)  
Ribbon (Carbon).....£2.00 (d)  
Spare Daisy Wheel.....£14 (d)  
Sheet Feeder.....£182 (a)

**BROTHER HR15**  
Daisy Wheel.....£18 (d)  
Tractor Feed.....£90 (a)  
Ribbon (Carbon/Nylon).....£3.00 (d)  
Sheet Feeder.....£182 (d)  
Keyboard.....£135 (a)

**Printer Leads:**  
BBC Parallel Lead (1.2m).....£6 (d)  
BBC Serial Lead (1.2m).....£6 (d)

**Other lengths can be supplied on order:**  
IBM Parallel Lead (2m).....£12 (d)

**PAPER & LABELS**  
**Plain Fanfold paper with micro perforations:**  
2000 sheets 9 1/4" x 11".....£13 (b)  
2000 sheets 14 1/4" x 11".....£18.50 (£4.50)

**Labels/1000:**  
Single Row 3 1/4 x 1 7/16".....£5.25 (d)  
Triple Row 27/16" x 17/16".....£5 (d)

BBC SPARE PARTS			
All Prices are Retail ex-VAT			
BBC & Misc:	8271.....£46	74LS10.....£0.24	
Keyboards.....£52	88LS120.....£3.00	74LS123.....£0.80	
Powers Supply.....£52	BBC PLUS:	74LS163.....£0.75	
Keyswitch.....£1.75	PAL16REN.....£13.50	74LS244.....£0.80	
Video ULA.....£18	64K x 4 DRAM.....£8.50	74LS245.....£1.10	
Serial ULA.....£14	6512A.....£12.50	74LS373.....£0.90	
DNFS.....£18	SAA5050.....£9.00	74LS393.....£1.00	
UHF MOD.....£4.50	6845SP.....£6.50		
6502A CPU.....£6.50	UPD7002.....£5.00	BBC MASTER:	
65C02 CPU.....£12	DS3691.....£3.50	1-Mbit ROM.....£39	
6522 VIA.....£3.50	7438.....£0.40	MSI CHROMA	
6522A VIA.....£5.50	74LS00.....£0.24	IC.....£13.50	
LM324.....£0.45	74LS04.....£0.24	65SC12P-2.....£12.50	



LEADING  
SUPPLIER TO THE  
BBC MARKET  
ESTABLISHED OVER 15 YEARS

# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177  
305 Edgware Road, London W2 Tel: 01-723 0233



For price details see page 1.



BRITISH BROADCASTING CORPORATION  
MASTER SERIES MICROCOMPUTER

## THE FAMILY COMPUTER

Now available from stock

This low cost high tech computer has developed specially as a computer for home use.

### SPECIFICATION

128K RAM, ADFS Filing system, BBC Basic version 4, MASTER style keyboard, a single 640K 3.5" double sided drive. RGB/Mono Monitor as an optional extra.

### Bundled software pack includes:

Desk Top Prog with note pad & calculator, VIEW 3.0, Card Index, LOGO & LOGOTRON. A set of exciting games and graphic demos.

## ACW443 CAMBRIDGE WORKSTATION

- \*A complete self-contained workstation.
- \*'Bundled' software as 32016 co-processor.
- \*8Mhz NS32016.
- \*20Mbyte Winchester + 1 400K Floppy Drive.
- \*4Mbyte RAM as standard.
- \*Hi-Res Monitor \*Detachable keyboard.
- \*Phone for detailed leaflet.

PHONE FOR DETAILS OF RANGE OF 32BIT  
SOFTWARE NOW AVAILABLE

## DOTPRINT PLUS

A uniquely versatile NLQ ROM  
for the BBC Micro.

- \* Built-in character font generator.
- \* Built-in view printer driver.
- \* Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
- \* True bold print as well as double width.
- \* 12 character pitch as standard.
- \* Fully variable pitch and line spacing.
- \* Suitable for fully 'EPSON' compatible printers with quad-density graphics.
- \* DOTPRINT PLUS for EPSON FX/RX and compatibles.
- \* DOTPRINT DUAL for EPSON MX range.

### MICROJUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

### NORMALLY JUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.

## 32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to your BBC.

- \* 6 Mhz. NS32016 CPU
- \* NS32081 Floating Point Processor.
- \* Bundled languages including: Fortran-77, Pascal, C, Cambridge Lisp, 32016 Assembler, 32Bit BBC Basic.
- \* 1Mbyte RAM fitted as standard.
- \* Phone for detailed leaflet.

## EPSON HI-80

- \* Low cost while maintaining precision.
- \* A4 with 4 colour precision plotting.
- \* Variety of pens available.
- \* Ideal for overhead transparencies.
- \* Powerful software commands allow complex plots.
- \* Superb line/bar/pie charts simply produced.

## STAR NL10

A 80 col 120 cps printer with fine NLQ at 30 cps offers novel and innovative features. There are no dip switches to set, full control from the front console. Plug in interface cartridge simplifies adaptation to different computers. Friction & Tractor feed as standards. Epson Compatible Graphics.

## NATIONAL PANASONIC KX P1080

A high performance low cost printer with full character pitch feature 10, 12, 15 & 17 cpi and proportional spacing in both draft and NLQ mode. 80 column, 100 cps draft and 20 cps in NLQ. Parallel interface and Friction and Tractor feeds as standard. Epson Compatible Graphics.

## EPSON LQ800

Uses top quality 24 pin dot-matrix technology.

- \* Superb 'letter quality' at 67cps.
- \* Fast clear draft quality at 200cps.
- \* LQ/Draft modes selectable from front panel.
- \* Variety of fonts, usable in both draft & LQ modes.
- \* Optional 'personality' modules for Diablo and IBM emulation.
- \* Optional Font modules.
- \* Friction feed.
- \* Hi Res bit image graphics with hex density.

## 512 CO-PROCESSOR

Brings professional software to the BBC Master.

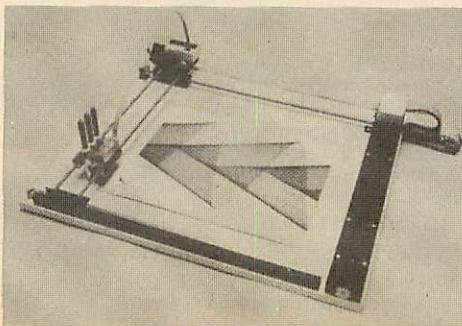
- \* 10 Mhz 80186 \*DOS PLUS.
- \* GEM Write & GEM Draw.
- \* 'WIMP' Environment with high quality Mouse.
- \* Runs many 'IBM' programs — even 'Flight Simulator'!
- \* Convert to/from IBM/BBC data.

## HITACHI 672 PLOTTER

- \* A3 four colour precision plotter.
- \* Serial and parallel ports as standard.
- \* Produces 'OHP' transparencies as well as plain paper.
- \* 'HP' graphics language or single character commands.

## GRAPHICS WORKSTATION

A A3 pen plotter with 0.1mm resolution allows graphs, charts, architectural drawings to be plotted using the 9 predefined plotting instructions or by using a CAD package. The pen mount allows a variety of pen types including drawing pens to be used or the following range of accessories to be fitted.



## OPTICAL SENSOR

This converts the plotter into an input device and offers a new range of applications: Scan or digitise a picture or a drawing to display or store. Traverse mazes and investigate methods of artificial intelligence. Reliably read bar codes.

## DRILL/ROUTER

This will drill holes, machine moulds and cut complex 3-D shapes in a range of suitable materials to a depth of 16mm. Driver software is supplied on disc and an optional application program is available to interface the drill/router to our NOVACAD package.

## SCRIBER

The sharp pointed scriber may be used to etch fine line drawings on surfaces such as scraperboard, wax coated copper etc. Full details on request. See page 1 for price.

All accessories available separately if required.



**BBC Computer  
& Econet  
Referral Centre**

**MAIL ORDER**  
17 Burnley Road  
London NW10 1ED  
Telex: 922800

**RETAIL SHOPS**  
15 Burnley Road, London NW10 1ED  
Tel: 01-208 1177 Telex: 922800  
(close to Dollis Hill ☺)

**West End Branch**  
305 Edgware Road, London W2  
Tel: 01-723 0233  
(near Edgware Road ☺)

For fast delivery telephone  
your order on 01-208 1177  
using VISA/Access Card



Orders welcome from  
government depts &  
educational establishments.

All prices ex VAT.  
Prices are subject  
to change without notice.

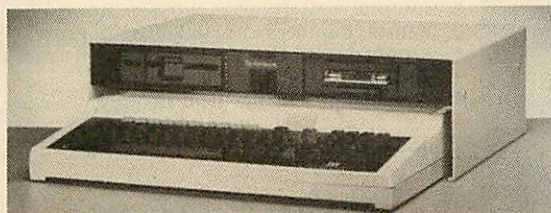
Please add carriage  
(a) £8.50 (Datapost)  
(b) £2.50  
(c) £1.50  
(d) £1.00



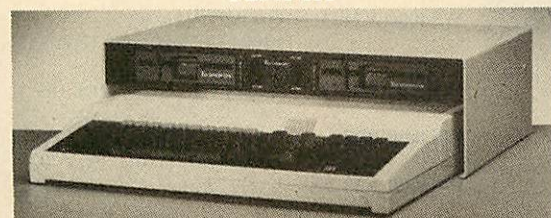
**TS 400**



**PD 800**



**P2041 HT**



**PD 800 P**

## DISC DRIVES

**TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.**

- \*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.
- \*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.
- \*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.
- \*The plinth version drives provide for a neat and compact system installation giving it a more professional look.
- \*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.
- \*Mass storage 20 Mbyte drives are available in the following versions:
  - \* P20HD Stand alone.
  - \* P204HP With a single floppy housed in a plinth version case.
  - \* P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.

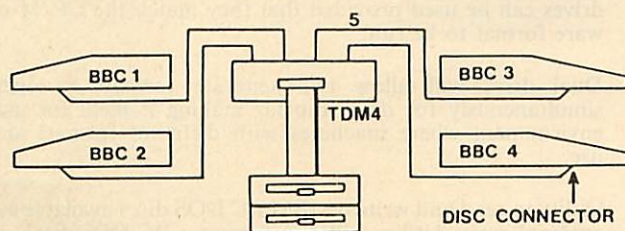
All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

**ALL TECHNOMATIC DRIVES CARRY A TWO  
YEAR WARRANTY AS STANDARD**

(Effective 01.08.86)

## DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



**TDM4 Quad Unit (up to 4 computers)**

**TDM2 Dual Unit (2 computers)**

## FLOPPICLENE

### Disc Drive Cleaning Kit

Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reusable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25" and 3.5" drives. Please see page 2 for prices.

## 3M FLOPPY DISCS



3M are the worlds largest producer of magnetic media and are acknowledged as leaders in magnetic media technology. Every single 3M Floppy Disc carries a written lifetime guarantee that it will perform reliably. Not only do 3M offer a highest quality product but also a very competitive price. Please see page 2 for details. 3M Floppy Discs are supplied in sturdy storage boxes each containing 10 discs.



# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177  
305 Edgware Road, London W2 Tel: 01-723 0233

## MODEMS

### MIRACLE WS4000

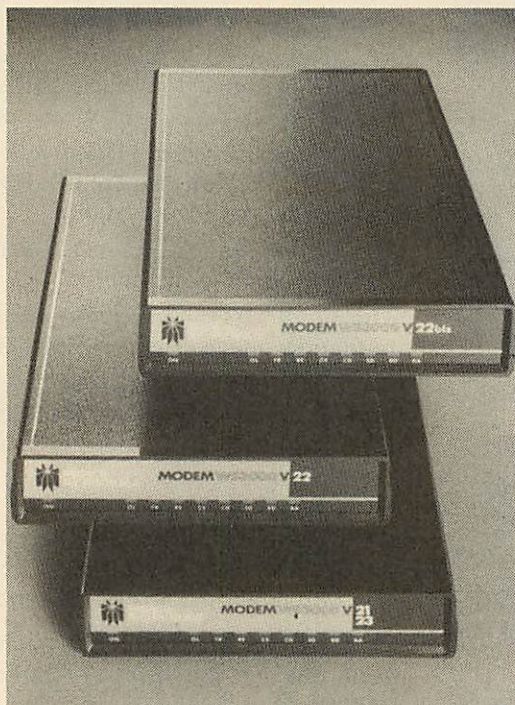
- \* A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
- \* Plain English commands make it simple to use, even for the first time user.
- \* Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
- \* Equalisation model in V23 for line-noise filtering.
- \* Many other options including upgrading to V22 and V22 bis.

### MIRACLE WS2000

- \* A comprehensive manually switched 'World Standard' modem.
- \* Competitively price with a capability to be upgraded for various options.
- \* BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
- \* Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).

- \* SK1 chip set for computer control.
- \* User port cable.
- \* Auto dial Board.
- \* Auto Answer Board.
- \* DS1 disc for auto dial facilities on Commstar.



WS 3000 Range



Please see page 2 for prices

### MIRACLE WS3000 RANGE

- \* A professional range of intelligent modems with full BABT approval.
- \* Auto Answer and Auto Dial facilities installed as standard.
- \* HAYES protocols implemented.
- \* Pulse or DTMF 'tone' dialing.
- \* Plain English command structure simplifies the use of the modem.
- \* Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
- \* A line sharing facility to differential between data and voice calls.
- \* Intelligent speed buffering converts 1200/1200 terminals to 1200/75
- \* Equalisation mode for line noise filtering.
- \* Internal battery back up for storing 63 names, numbers and default settings.
- \* Upgrade path for 1200/1200 and 2400/2400 and security encryption.
- \* Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

### SPECIFICATIONS

- WS4000 V2123: \*CCITT V21/V23.  
\*300/300, 600 and 1200 half duplex, 1200/75.
- WS3000 V2123: \*CCITT V21/V23/Bell 103.  
300/300, 600 and 1200/75
- WS3000 V22: \*As V2123 and also 1200/1200 full duplex.
- WS3000 V22 bis: \*As V22 and also 2400/2400.

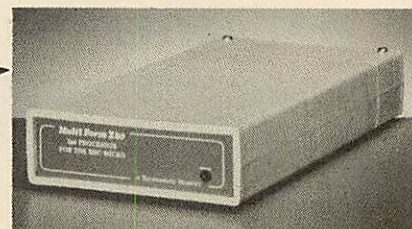
## MULTIFORM Z80

includes a  
**FREE**  
Pocket Wordstar  
package

A unique Z80 2nd Processor with a 'MULTIFORMAT' capability.

- \* It is capable of running most CP/M 2.2 format applications programs on the BBC.
- \* Connects to the BBC via 1MHz bus, no restriction on the cable length. OS/M operating system on rom.
- \* Integral mains psu and 64K on board ram.
- \* 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
- \* Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
- \* Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M.
- \* Multiform is fully compatible with Acorn's 8271 and 1770 DFS on models B, B plus and the Master.

- \* Single density dfs allows single density CP/M format use. Double density dfs allows both single and double density CP/M formats to be used.
- \* Single or dual, single sided or double sided and 40 or 80 track drives can be used provided that they match the CP/M software format to be run.
- \* Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
- \* Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
- \* Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.



Please see page 1 for prices



BBC Computer  
& Econet  
Referral Centre

**RETAIL SHOPS**  
15 Burnley Road, London NW10 1ED  
Tel: 01-208 1177 Telex: 922800  
(close to Dollis Hill ☺)

For fast delivery telephone  
your order on 01-208 1177  
using VISA/Access Card



Orders welcome from  
government depts &  
educational establishments.

All prices ex VAT.  
Prices are subject  
to change without notice.

Please add carriage  
(a) £8.50 (Datapost)  
(b) £2.50  
(c) £1.50  
(d) £1.00

**MAIL ORDER**  
17 Burnley Road  
London NW10 1ED  
Telex: 922800

**West End Branch**  
305 Edgware Road, London W2  
Tel: 01-723 0233  
(near Edgware Road ☺)

Now supports  
Acorn ADFS  
Programs 27256  
in single pass

# EPROMER II

## Eprom Programmer for the BBC Micro Series



Epromer is supplied with a integral mains psu, all the necessary cables, a manual and software on disc. Disc also contains the rom image for use with sideways ram. Rom based software is available as an optional extra if required. Epromer is fully compatible with Acorn DFS on the BBC B, B+ and the MASTER. Please see page 2 for price.

- \* A sophisticated Eprom Programmer that uses the latest Eprom Programming technology to simplify the use of the programmer and at the same time allowing the programmer the full control of the programming process.
- \* It handles the full range of popular single rail Eproms up to 27256.
- \* Powerful menu driven software makes the programming of eproms simple and efficient.
- \* Selectable programming voltage 25/21/12.5V.
- \* Two programming option, standard and algorithmic for eproms capable of high speed programming. 27128 can be programmed in just over 2 mins.
- \* Single address to full eprom address selectable for any of the epromer function ie blank check/read/burn/verify.
- \* Full screen editor with input in hex or ASCII.
- \* Software interface for special programming requirements eg programming alternate bytes etc.
- \* Many other useful utilities included.

Please send for full specification sheet.

# META VERSION THREE

The only package available in the micro market that will assemble 27 different processors at the price offered. (Please see page 2).

Now Available

- \* Assembly for even more processors
- \* Now over 70k long on 2 16K Roms and 2 Discs
- \* Dozens of new options, features and directives

The Original META system sold hundreds worldwide; it's being used in Universities, Polytechnics, British Telecom, the BBC, the MOD etc etc.

Now there's an even better version. It is supplied on two 16K roms and two discs and it is fully compatible with all BBC models including Master and gives you complete Editing and Assembly facilities for all the listed processors:

1802	6800	8085	6305
HD 64180	6802	Z8	6801
Z80	68HC11	68120	6803
6502 (including all CMOS variants)	68000	68121	6805
65C812	8048 Series	6808	6804
65C816	8051 Series	6301	6809
	8080	6303	

META uses the appropriate standard mnemonics for each, eg. LD (HL), 0ABH in Z80 and MOVE. B DO, \$50 (A5, D6.L) in 68000 etc.

Full nestable Macro facilities are provided, and nestable conditional Assembly, (IF/ELSE/ENDIF), Modular source code (including parameter passing). True local and global labels, 32 bit labels and arithmetic (incl. MUL, DIV, AND, OR, XOR, SHL etc). 30 ways to send object code during Assembly, including Intel Hex, S.Record, Binary etc to Disc files, RS423, EPROM emulators etc, local reassembly and over 50 directives, including DS.X, DC.X, EQUX, FCB etc).

Wordwise-style Editor integrated in with Assembler; Search/Search-Replace, Block copy/delete, markers etc; dozens of special features and functions for Assembly code programmer. Fast and Friendly to use.

Plus special new serial Communicator Area with Complex Option page etc.

Send for your detailed spec sheet on the META Assembler and the PORTAL EPROM Emulators. Set of disassemblers and Logic Analyser coming soon.

Please specify the computer type when ordering.

# PORTAL EMULATOR

- \* Provides real time emulation of all listed eproms at 150 ns.
- \* Totally software driven by (META).
- \* Compatible with 'piggyback' processors.
- \* Upto 4 portals can be used on the same BBC lead.
- \* Each PORTAL has a lead terminated with a 28 pin header to plug into the socket you need to emulate.
- \* Various options available for sending code: eg use two PORTALS for 16 bit data bus with sequential PORTAL skipping.

PORTAL is available in two versions:

PORTAL 128 for 2716, 2732, 2764, 27128.

PORTAL 512 for all of the ones listed above + 27256 and 27512.

# BOOKS

No VAT  
Carriage  
Code  
(c)

## LANGUAGES

6502 Assy Lang Prog.....	£19.95
6502 Programming.....	£13.95
8086 Book.....	£23.95
Acorn BCPL User Guide.....	£15.00
Acorn FORTH.....	£7.50
Acorn LISP.....	£7.50
S-PASCAL.....	£7.50
Acorn ISO Pascal Ref Manual.....	£10.00
Intro to COMAL.....	£10.00
Intro to LOGO.....	£7.50
Micro Prolog Ref Manual.....	£10.00
Introduction to Turbo Pascal.....	£14.95
Prog the Micro with Pascal.....	£8.50
The UNIX Book.....	£7.50
Unix User Guide.....	£19.95
Understanding Unix.....	£18.45

View 3.0 User Guide.....	£10.00
Viewstore.....	£10.00
Viewsheets.....	£10.00
Wordwise Plus.....	£9.95

## SOUND & GRAPHICS:

Advanced Graphics with BBC.....	£6.00
Creative Sound on the BBC.....	£9.95
Mastering Music.....	£6.95

## DISC DRIVE SYSTEMS:

Advanced Disc User Guide.....	£14.95
BBC Micro Disc Companion.....	£7.95
Disc Book.....	£3.50
Disc Programming Techniques.....	£7.95
Disc Systems.....	£6.95
File Handling on the BBC.....	£6.95

## APPLICATIONS:

Interfacing Proj for BBC.....	£6.95
BBC and Small Business.....	£5.75

## PROFESSIONAL SOFTWARE

Wordstar made easy.....	£16.95
Introduction to Wordstar.....	£17.95
Wordstar Handbook.....	£11.95
dBase-II for the first time user.....	£16.95
Understanding dBase-III.....	£22.95
Multiplan Made Easy.....	£18.95
Multimate Complete Guide.....	£16.95
ABC of LOTUS 123.....	£17.45
1-2-3 for Business.....	£16.95
Adv Tech in dBase II/III.....	£22.95
Mastering CP/M.....	£17.95
CP/M Bible.....	£16.50
Introducing CP/M on BBC	
& Z80.....	£9.95
MS/PC DOS Prompt.....	£10.95

## BBC MICRO GUIDE BOOKS

BBC User Guide Acorn.....	£15.00
BBC Plus User Guide.....	£15.00
Drawing your Own BBC Programs.....	£6.95
Inside Information.....	£8.95
Math Prog in BBC Basic.....	£7.95
Toolbox 2.....	£10.95
Turtle Graphics.....	£7.50
VIA 6522 Book.....	£4.50

## PROGRAMMING/UTILITY

Advanced User Guide.....	£12.50
Applied Ass./Lang on the BBC.....	£9.95
BBC Micro Sideways ROM's RAM's.....	£9.95
BBC Micro Sideways Roms	
B. Smith.....	£9.95
Guide to the BBC ROM.....	£9.95
Beginners Guide to W.P.....	£7.95



**BBC Computer  
& Econet  
Referral Centre**

**MAIL ORDER**  
17 Burnley Road  
London NW10 1ED  
Telex: 922800

**RETAIL SHOPS**  
15 Burnley Road, London NW10 1ED  
Tel: 01-208 1177 Telex: 922800  
(close to Dollis Hill ☺)

**West End Branch**  
305 Edgware Road, London W2  
Tel: 01-723 0233  
(near Edgware Road ☺)

For fast delivery telephone  
your order on 01-208 1177  
using VISA/Access Card



Orders welcome from  
government depts &  
educational establishments.

All prices ex VAT.  
Prices are subject  
to change without notice.

Please add carriage  
(a) £8.50 (Datapost)  
(b) £2.50  
(c) £1.50  
(d) £1.00

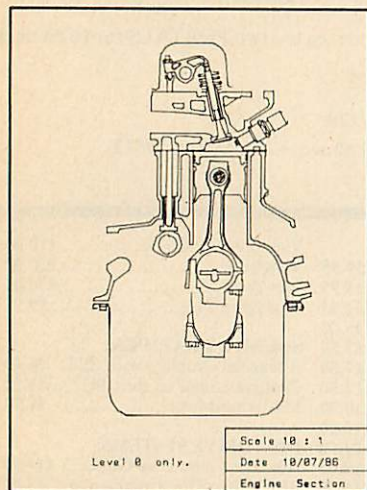
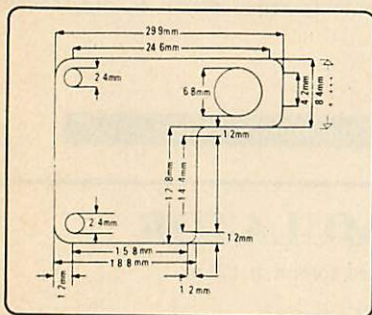
# NOVACAD

## Computer Aided Draughting for the BBC Micro

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

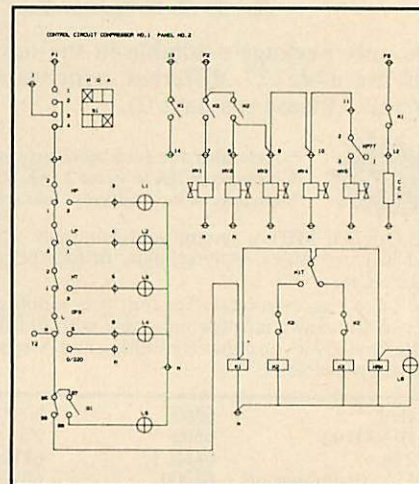
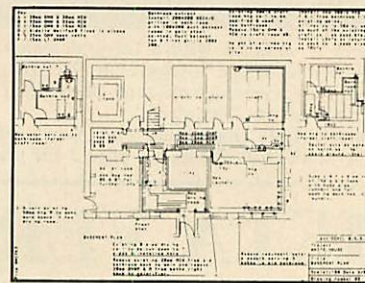
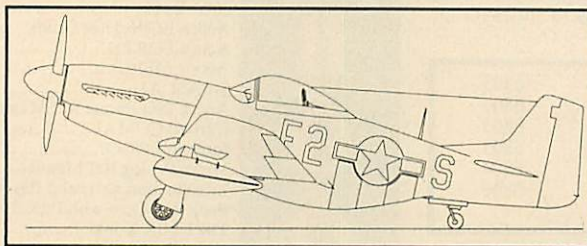
NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects,

engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.



### The major features of NOVACAD are:

- \* Simple and easy to use with logical command sequence.
- \* A large drawing area (approx 15 screens).
- \* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- \* A zoom facility allowing magnification of up to 20 times to insert finer details.
- \* Block copy of shapes on the screen for repetitive use.
- \* Text entry at any 90° orientation at any position on the screen.
- \* Create multi layer drawing with 8 levels available.
- \* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- \* Printer routine for Epson 80 and 136 column printers.
- \* A unique facility to output to any BBC compatible plotter.



### MINIMUM HARDWARE REQUIREMENTS

- Any BBC range computer with Acorn DFS.
- 40 Track single sided single drive.
- Epson compatible dot matrix printer.

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours with shadow memory, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will have additional user memory for more complex drawings. 6502 second processor will also increase the drawing speed.

### NOVACAD is available in two versions

- \*BASIC version for cursor control from the keyboard.
- \*T/M version for cursor control from the keyboard, Tracker Ball or a Mouse.

### OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like Epson HI 80, Hitachi 672, Plotmate, Penman and HP GL. This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

**NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.**



# LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

## PROBLEMS AND PROGRAMS

Sir, The academic year just beginning sees the start of the first GCSE courses, replacing GCE 'O' and 'A' levels, for students in our secondary schools. The two year courses will be watched eagerly by parents, teachers and industrialists alike to see how their results match the promise of their syllabi.

Many of the courses have set new heights for learning in secondary schools. Problem solving, rather than rote regurgitation, will become the new norm. One subject, however, seems to have made a major change of direction. This is the Computer Studies GCSE, where some syllabi recommend the de-emphasis of programming as an accredited course activity.

Reasons quoted for this include: that computing should be applications based, rather than centred around the non-realistic gas bill programs which children were assumed to churn out en-route to the 'O' level. Others would have us believe that programming is an activity for a select few, or there again for no-one, because computers will eventually program themselves. Hence we should concentrate on the more important aspects of problem solving.

However, talk of problem solving brings us to a new concept in mathematical education. Teachers are encouraging children to use the computer to design, test and explore problem solutions using Basic library routines or Logo procedures. Not so long ago, we called that programming. Also some secondary English departments are

beginning to use similar techniques in language work.

What is more exciting still is that primary schools, having been warned to discard programming four years ago, are now becoming embroiled in programming activities in almost every forward-looking classroom. Programming in maths, language, design, science and project work is seen as part of the key to unleashing children's thinking skills and assisting with social skills, by encouraging teamwork.

How sad then, to see many founders of secondary school computing turning their backs on programming as an activity, when other curriculum areas accept that it still has a great role to play. One faint light on the horizon is the many and varied information technology (IT) courses, which are hoping to gain credence with teachers through the TVEI schemes. Some of the more modular versions of these courses accept the role of programming as a necessary part of problem solving, and recognise the enjoyment with which many of our children tackle programming.

Such syllabi contain modules which cover programming in new exciting ways, but although these courses are acceptable up to 1988, their continuity is in the hands of the Secondary Examinations Council, and this august body might equate IT to computer studies. In such a case, we can only guess the end result. Perhaps programming activities in the subject area called computing will cease, or continue subversively, or perhaps we will see programming taking up a place as a problem solving tool within many subject areas.

Whatever the outcome, programming remains one of the few activities which links concrete experience to abstract thought. It gives each of us the power to build, test and refine our hypotheses and allows us to realise the power of language, demonstrating for example that a thought, expressed in written words can control devices within the world outside the computer.

Joe Telford  
Cleveland

## CARTRIDGE CRITICISM

Sir, After two years with a trusty model B, I decided to upgrade to a Master 128. I am generally very happy with it.

What I am not so happy with are my first ROM cartridges, one of which, despite working in the electronics trade, I damaged on my first attempt to insert a ROM. The basic design seems flimsy and over priced. Surely it would have made more sense to have two fully enclosed halves held together with screws fitted with two normal ROM sockets. It would be simple to remove ROMs, by normal prising from each end, with the case halves separated.

I enjoy reading your magazine each month but is it possible during software reviews to say if the programs are Master compatible?

David Hallsworth  
BFPO 41

Acorn's reply to criticism of these cartridges is that people don't use them properly. The answer to that, surely, is that it shouldn't be possible to use them improperly. No doubt third party companies will mop up.

On the Master front, there is little Master-compatible software around – although the appearance of the Compact looks set to change that.

## ACORN'S HEAD IN THE CLOUDS

Sir, I am writing in reply to Reg Smith's letter (August) commenting on a letter of mine. I would like to clear up the point I was making, concerning the model B. A few months ago before the Master's launch, the BBC B was selling for still a ludicrously high price. The technology was there to add shadow memory, but Acorn chose not to introduce it. Amstrad showed us what real value for money was. There is no excuse why Acorn couldn't have bundled in a monitor and small drive (as retailers are doing with the Electron).

Obviously when the model B was launched it was way ahead of its time. But Acorn chose to keep its head in the clouds until it was too late.

A good structured approach to programming is important, but to rely on loading and reloading chunks of program to achieve this can only lead to lengthy development times and unwieldy maintenance of a program. When technology existed to make even a modest full 32k available, Acorn refused to listen.

IS Gibson  
Maidstone, Kent

Acorn has now launched the Master Compact bundled with disc drive and monitor. Obviously comments such as these have not fallen on totally deaf ears.



## ARMCHAIR USER

Sir, I first started taking *Acorn User* early in 1985 when I had access to a BBC micro and began Basic programming. This was my first experience of computers. However, that has long since passed, but I still read your magazine and would like to express my thanks for an enjoyable and educational read, even for me as an 'Armchair User'.

I'm also glad to see the start of Tessie Revivis' articles on machine code, now I will be able to understand all the yellow pages!

P Stanley  
Bacup, Lancs

## BALANCING ACT

Sir, Further to your review of our Teletext Control System (June, page 147), I would like to offer some experienced comments to balance those of your reviewer who has not had sufficient time to explore this very powerful package. The two programs: *Tex* – the teletext editor, and *Pam* – the picture animation manager considerably simplify the task of producing animated newsreels and adverts.

The original documentation was skilfully reduced to quick-reference proportions when it became evident that, with all the screen-prompts, eight A4 pages would be ample. The menu at the bottom of the screen maps onto the red keys directly; it is much easier to use than a card strip. There are so many options to be kept in view at the same time as the source and destination pages that some abbreviation is necessary. The operations soon become

fluent and abbreviations are then preferable.

Scrolling before saving prevents accidental overwrite; your reviewer might have called this a minor inconvenience or a compromise but he chose an exaggerated term which does not inform the reader. Furthermore, sequences can be any length up to 50 pictures and the review is seriously misleading on this matter.

I would like to point out that our programs are complex and powerful tools which defy simplistic treatment. They were designed to provide long-term interest with so much depth that we consider it valuable for a teacher to spend some time exploring all the options before allowing general use. We advise our educational customers accordingly.

A H Evans  
Promotional ArtWork  
Systems, Leeds

## LOADING THE UNLOADABLE

Sir, While flicking through your excellent publication, I noticed an article entitled Programs Retrieved by Simon Kindlen in the August '86 issue. I would like to proffer a simpler method of loading the unloadable. Before loading the program, enter:

\*OPT2,0

This, as indicated in the User Guide, will cause the computer to ignore errors when loading (although an error message is given), thus the file is read complete.

If, as is often the case, only two or three bytes are corrupt, they can be easily changed without re-typing whole blocks of code.

Paul Tarttelin  
Berks

## COMMUNICATION PROBLEM

Sir, Let's have more letter-writing, and thank-you to *Acorn User* for keeping us Acorn users in touch with each other. In my experience Acorn Computers certainly does not do a very good job in either of those departments. Don't worry J N Wilmott of North Humberside, (Letters, August issue), your reply will arrive, but only if you are prepared to back it up with pounds spent on phone calls and a patient wait. Then of course you have to accept the absolute minimum of information and not complain about it (Acorn is a very busy company you know – you can tell that by the amount of time it puts your phone call on hold).

To other Master-users out there, may I pass on a few things that I have learnt.

The *Master Welcome Guide* is only 'to enable the new user to make a start' and then it 'is reasonably common practice in the industry to make additional guides available for a small charge'. (Quotes from Acorn).

Certain incompatibilities between the old and the new DFS might be overcome by booting with Shift-Z-Break.

More serious incompatibilities arise if your disc drive doesn't even work! Anyone who has 40 track DFS problems, don't worry too much. Have a peep under your keyboard and check out the 1772 controller chip. (Yes it still tells you on the screen it's a 1770, but it's not). This is not widely publicised, if at all, and can lead to problems, but can be solved by a new 2.28 DFS available as an upgrade from Acorn. The new DFS will allow you to change step

times down to 12ms. It will be standard on the 1772 chips in the future says Acorn. All this should be known to Acorn dealers, but was news to my local supplier.

*Welcome* discs seem to be notoriously bad. I'm about to return my third. Keep sending them back, I say! I have had no success at all with either Dircopy or Copyfiles.

I still maintain that the Master must be a good machine, but then I grew up with the BBC B and I'm definitely biased.

However, my beliefs have taken a bit of a battering over the last four months since I took delivery of my first Master. (I'm now on my third machine and things are being sorted out, I hope. Remember though that things do not sort themselves out on their own!).

Andrew Megginson  
Loughborough

## FROM BASIC TO VIEWSHEET

Sir, I have just purchased a BBC Master. I wish to be able to input data into *ViewSheet* directly from Basic. The following example procedure call illustrates the requirement:

```
PROCin_sheet$(text$,
x%,y%)
```

where text\$ is the text to be inserted, and x% and y% give the rows and column in which to insert the text.

Also I need something like:

```
PROCin_sheet%
(value%,x%,y%)
```

where value% is the integer value to be inserted. Insertion of floating point numbers would also be useful.

Can readers help?

Brian Bowman  
Bowman & Co  
(Software) Ltd, Bucks



## NO WAY TO SAVE MEMORY

Sir, I have read the letter in the July issue of *Acorn User* about the Electron not being as good as the BBC micro.

I need a routine to enable me to alter the ROM as on other machines. I thought to myself, if the Electron has the same Central Processing Unit and the same amount of ROM, then why can't I save the ROM of a Beeb and then poke it into the Electron's ROM?

Edward Avis  
Exeter

Most ROMs should work on the Electron providing that they do not rely on the BBC micro hardware (in other words the teletext chip, the screen display chip or any of the interfaces).

Companies like ACP and Slogger are good sources of Elk firmware.

ROMs being what they are (Read Only Memory) it is not possible to perform pokes to change ROMs and make them compatible.

## NEW SOUND FOR ELECTRON

Sir, I have recently purchased an Electron and I am quite pleased with it.

I have a Master RAM board fitted to my Electron and a Plus 1 unit.

I do not like the sounds my Electron produces, so would it be possible to add the BBC micro's sound chip to improve it? I would also like to know if the mode 7 chip (SAA5050) would be able to fit into the spare ROM socket inside my Electron.

I know that the 6522 interface chip can be fitted to the Electron, can this be used to

link two Electrons together? Would the addition of a 6845 CRT controller improve software compatibility between the Beeb and Electron? With my Master RAM board I have a 64k Electron running at BBC speed.

Would this enable me to run some Beeb games where memory is lacking?

P Key  
Bridgend

It should be possible to add extra sound generating circuitry to the Electron,



## Electron: a basic micro capable of sophisticated expansion

however I have no details on how to do this (does anybody have any ideas?).

A teletext chip could not be added inside your Electron case as you suggest – however a teletext adaptor was sold for the Electron a couple of years ago by Sir Computers.

Unfortunately it has now ceased trading, but you might be able to pick one up second hand via the free ads section at the back of the magazine (has anybody got one to sell?).

Electron owners watch out for a series on interfacing your Electron, coming soon in *AU*!

## EXPANDING THE ELK

Sir, I am writing for some much needed expert advice and information.

At present, I am the owner of an Acorn Electron micro, with the only peripherals being a cheap tapedrive and a Hitachi television RGB monitor. The time has now come for system expansion to include a wordprocessor, mainly to be used for standard letter writing and CVs, for

Acorn dealer should stock these – prices vary but expect to pay up to £100. The recommended disc interface is the Advanced Plus 4 from ACP (reviewed in the July issue) cost £80.44.

There is a whole variety of disc drives – again the July *AU* provides full details, but you must anticipate spending anywhere between £80 – £250 depending on your requirements.

## RAMMING IT IN

Sir, Recently I bought a Vigen cartridge system and wish to know whether it is possible to have sideways RAM by using a RAM chip in one of the cartridges. If so, what type of RAM chip would I need and where could I obtain it?

Michael McCartney  
Dorset

Yes it is possible, but rather involved to use a cartridge. Basically you need to solder a wire onto pin 26 of a 6264 RAM chip and take this to any write line on the main BBC PCB – typically pin 10 of the 8271 (IC78). Pin 26 on the RAM chip should be bent out and not inserted into the cartridge. You will also need to write specialist software to enable your ROM-based programs to be transferred across into the RAM. This involves \*LOADing the ROM image into RAM, selecting the ROM slot number by writing it into &F4 and &FE30, and then copying the image across to &8000 onwards byte by byte – obviously this needs to be a machine code program.

A forthcoming article in *AU* will show you how to install 8k of sideways RAM into a Beeb.

which I presume I would require a program on disc with its associated disc drive.

Being a newcomer to micros, I need some advice on exactly what hardware and software I would require and what type and make you would personally recommend plus some idea of the actual costings involved.

P Hawks  
Portsmouth

I suggest you set yourself up with the *View* word-processor. This is supplied in cartridge form for the Electron so you will also need to obtain the Electron Plus 1 expansion unit. Your local



## POKING ABOUT

Sir, I spent ages puzzling out how to dodge the arrows in *Wizadore* and therefore decided to find or make a poke which would get rid of them:

```
*LOAD WIZADORE
?&37AA=&00
CALL&4F6A
```

However, it does not get rid of the bird's arrows.

I've also devised a poke for the game *Commando* to give infinite lives:

```
*LOAD DGAME
?&23BB=0
CALL&6D00
```

G M Reid  
Middlesex

## WHAT TO DO WITH THE WAND

Sir, I have got the answer to Andy W's question on *Castle Quest*. Take the wand to the place just right of where the troll is and go down until you see two yellow men. Kill these men and go right, but don't fall off the place by the ladder into the moat. Just throw the wand right and you will have completed *Castle Quest*.

Michael Joe Woolley  
Dorset

## QUESTIONS ANSWERED

Sir, When you finish *Castle Quest*, it's a great shame that all you see are a coin, a gold bar and ruby in the wall with the message: 'Game over, Treasure found'.

In reply to Alex Atkin's plea for assistance to get past the troll, you get the gem from the green guards up from where you start. With this item you run to the troll's bridge and he will rush at you.

Throw the gem at him. He will catch it and run back to his lair, leaving the path free for you to go through. At later stages of the game you can also use a gold bar or a coin.

If you want, you can recover the gem (or coin or gold) from him. You do this by waiting for him to come back up, then let him run along a little, ensuring that he follows you. Then duck down the other ladder - grabbing the gem - and run off. The troll follows, but soon gives up.

To get past the spider at the other side get the torches (one from near the green guards, the other from near the starting position) and place one along the route of the little red men, then round them into the top hut with the other torch. Follow them and make them go into the spider's lair by blocking their route back. Follow them in fairly closely, but not too closely as they may get behind you and run off. The spider comes down and eats one, you grab the sword and push them back through. It is important that you keep them close or even one on top of the other as that way, if they continue past the sword, the second spider will only eat two, whereas he could eat the remaining three if they were apart, leaving you stranded in the middle, having to die and start again. There is no point in going straight through as the witch will kill you and you can't take the red men with you as they just go back to the spiders' area, leaving you stranded. The red men come back enabling you to go through with your bucket of water to kill the witch and get the wand. However, the sword won't kill the troll, spiders or witch.

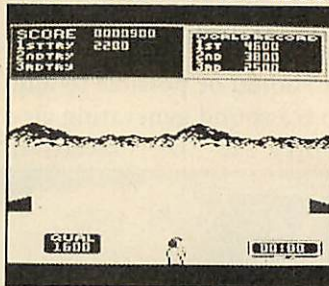
Michael Bickett  
Glasgow

## HYPER CHEAT

Sir, Want to know how to cheat at *Hypersports*? Do you want to know how to get rid of the vault and replace it with the shooting?

Well here's how!

Use a disc editor to find track 00 sector 04 and about



**Hypersports: how to cheat**

half way through the sector there is a set of loading commands. All you have to do to change the order is to change the numbers after the \*L.CODE<number>. The numbers correspond to the events as follows:

- 1 Swimming
- 2 Shooting
- 3 Archery
- 4 Triple Jump
- 5 Weight Lifting
- 6 Vault

Iain Freeman  
Glasgow

## PRAISE THE ELECTRON

Sir, I feel I have to reply to J Harris of Preston's letter about the Electron.

Yes it has its faults such as a tacky PSU plug type, it's fragile to say the least, but what can you expect for £79... I once had a Dragon 32 and what a junk heap that was. Compared to the Electron it was a snail and not reliable.

The Electron has a good Basic and assembler, a nice keyboard, a so-so manual.

To sum up it's a very nice

micro. I have two questions, is there an RTTY program for the Electron and also a toolkit ROM that will give partial re-number on the Elk?

Keep up the good work.

Peter Baillie  
West Lothian

Beebugsoft produces its *Toolkit ROM* for the Electron (phone (0727) 60263).

I am not aware of any specific RTTY programs for the Electron, do any readers know the answer?

## PRINTER RULES

Sir, Like K G Schofield (Letters, August) I decided to buy an Amstrad DMP2000 printer as there had been complimentary remarks about it in *Beebug* and, like him, I have been highly delighted. However, one problem arose when I wanted to replace the ribbon, the suppliers (Comet) did not carry ribbons in stock so I asked them to order some. After waiting three weeks, I was becoming desperate until I happened to be in the local branch of John Lewis where I was told that they always had ribbons in stock.

From this experience I have deduced two rules which I'd like to pass on to readers:

1. Don't buy equipment which uses consumable items like ribbons unless the dealer can assure you that they will always be able to supply them on demand.

2. Don't ignore the high street stores as they can sometimes be more reliable (and often cheaper).

Many thanks for your excellent magazine which always contains something of interest.

David Driver  
Nottingham



## MISSING LINKS

Sir, First of all, Mr Bonehill (June 86) asked about a book to make a simple robot's arm. I would advise he buys *How To Make Computer-Controlled Robots* published by Usborne. It is written for 11+ age and is simple to follow.

My query is that I want to learn how to write linked lists in BBC Basic. Please could you recommend some books. I would prefer ones that assume no previous knowledge of computing, as they are usually the best written texts, but would like to know of anything on linked lists.

Paul Turner  
Co Durham

Who hasn't looked through his back issues of *AU* then! Stan Froco covered the subject in our August 1983 issue, pages 24 and 25 to be precise. Next...

## FULL STREAM AHEAD

Sir, I have just bought *South-ern Belle* and I have to say, it's brill. How, then, can a program of this quality enter the top 20 at number 7 in June and one month later fall out. I don't understand it. But if you've got Computer Concepts' *Disc Doctor* the game crashes.

To solve the problem, either take *Disc Doctor* out, or use the following program:

```
10 MODE4
20 ?(673+N)=0
30 END
```

The N represents the number of the hole you have placed the chip in, ie, if ROM number is 14 then

```
10 MODE4
20 ?(687)=0
```

30 END

This will disable the ROM until you switch on the computer.

Paul Gent  
Stockport

## HOW TO HIT THE HEIGHTS

Sir, I have been examining your high scores chart (ha ha ha), I have one comment to make, RASSPP!

If you would care to observe, in your chart the high score for *Chukkie Egg* stands at thirty million! The game's score chart can only display scores up to 100,000.

Please tell me how it is possible to get this score, without going back to 000000 all the time.

I have never heard of anybody reaching eighty million at any game, let alone *Chuk-*

*kie Egg*, or, come to think of it, twenty million, at *Frak!*

It is very frustrating for us lesser players, who know we have not a hope of reaching, never mind bettering, these so-called high scores.

Please demand proof that readers have actually achieved the score they boast.

Yet, I can on the disc version of *Elite* for the BBC B, reach the dangerous status, get all of the equipment, complete the first mission, attain 100,000 credits, and be in the second or third galaxy in less than one day. Without cheating.

Jason Dempsey  
Surrey

The only way to achieve these highly enviable megascoring is to go round and round the clock. Also you can expect it to take days to attain these heights!

## Latest round-up of games high scores

Battletank	Superior	117,400	Stephen Gayler
Castle Quest	Superior	2,270	Jonathan J Hallet
Fortress	Pace	138,720	Stephen Gayler
Match Day	Ocean	14-0	Peter Harvey
Mr Ee	Micro Power	1,012,950	Stewart Roberts
Overdrive (BBC)	Superior	380,640	Stephen Gayler
Rocket Raid	Acornsoft	168,010	Stephen Gayler
Zalaga	Aardvark	29,329,420	Stephen Gayler

All time bests: *Aviator*, P. Hopgood, 30,450; *Android Attack*, Tim Hedger, 1,495,105; *Arcadians*, Nidz Islam, 98,020; *Chukkie Egg*, Stephen Concoran, 30,275,420; *Crazy Painter*, Richard Arundale, 279,790; *Cybertron*, Niaz Islam, 715,960; *Frak!*, Paul O'Malley, 20,000,200; *Free Fall*, Philip Comber, 5,024; *Hopper*, John Durrans, 52,422; *JCB Digger*, Stephen Concoran, 131,450; *Killer Gorilla*, Stephen Concoran, 836,475; *Meteors*, P Ludgate, 498,500; *Missile Control*, Ian Boffin, 469,225; *Monsters*, Stephen Concoran, 283,000; *Moonraider*, Stephen Concoran, 642,125; *Overdrive (Electron)*, P Ludgate, 1,011,720; *Painter*, Nigel Shaw, 203,690; *Pengo*, Stewart Roberts, 300,400; *Planetoids*, Stephen Concoran, 3,186,450; *Pole Position*, Niaz Islam, 384,250; *Snapper (BBC)*, Peter Simpson, 1,839,210; *Space Adventure*, Mark Bradshaw, 4,890; *Starship Command*, Ian Boffin, 8,420; *Way of the Exploding Fist*, C Parsons, 397,100.

Please say whether your score was notched up on a BBC micro or Electron when sending in your games high scores as in future we hope to be publishing separate tables for each micro.

## NEW RULES FOR HIGH SCORES

Sir, Your magazine continues to print high-score tables, one of the few that does, and looking at the August issue on page 55, I can see why so many magazines do not. *Mr Ee!* is the only high score which has been beaten since May 1986. Not only that but the table is dominated by three people. These scores represent gaming skill, certainly more than I possess, but what is the point? These people are obviously good but they are credited every month and the scores are out of reach of most people.

The way arcade game designers by-passed the skilled few was to have an all-time hall of fame, to be looked on with wonder, and a daily high score so people like me had a chance. Although you can contend that the micro games market is different, it cannot be so different or you wouldn't print high scores. The inclusion of a monthly high score total would, I am sure, liven up this section of the magazine.

V J Roberts  
Essex

Points taken, so here's a new set of rules for high scores in future issues.

First, the score must be witnessed by two people, at least one of whom is over 18, and preferably a parent.

Second, any score unbeaten in three months will go into an 'all-time best' listing at the bottom of the regular table.

Third, entries must say which machine the scores were on - BBC, Master or Electron - so we can do separate charts.

Let's see if that liven up the chart.



# 6502 Development System for the BBC Micro.

Fast Assembler  
Fast Linker  
Flexible Loader  
Fully Relocatable

Sideways RAM

**Code and Data  
separation  
for ROM or RAM code.**

Disc or ROM  
Library Included  
Absolute option  
Modular Source

**Now with conditional assembly and ADFS compatibility**

## Structured Assembler Programming on the BBC

Be like the professionals. Change to a relocatable assembler. Only £22.50 for the Disc and Sideways RAM version plus £7.50 for the ROM. Full Source code available, POA.

*'Excellent value for money' – Viewfax Tubelink*

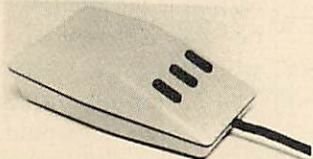
*Please state 40T or 80T, single or double sided disc*

### Mijas Software

PO Box 2, Sutton Scotney, Winchester, Hants. SO21 3LU

## BBC ☆ MASTER ☆ ELECTRON ☆ MICE

### \* MEGAMOUSE



**Megamouse** hardware is a very high quality UK manufactured BBC mouse which is highly accurate and utilises a slip-free rubber-coated ball. Because of its design, quality and accuracy – 100 points to inch resolution – it is widely used by professionals. **£59.90 incl.** AMX Compatible

### \* DIGIMOUSE



**Digimouse** Another accurate and quality input device – second only to Megamouse. 50 points to inch resolution. Rubber coated ball. Ideal for popular use with Wigmore, AMX and other mouse packages. Incorporate in your own software with unprotected machine code routines provided. **£34.90 incl.**

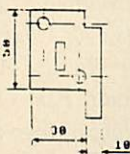
### \* ANAMOUSE



**Anamouse** uses analogue port – therefore **COMPATIBLE WITH ELECTRON +1**. Non slip rubber ball. High quality potentiometers. Includes user routines RB. Ideal on BBC where 2 axis information is also needed. **£34.90 incl.**

### \* CADMOUSE SOFTWARE

**Cadmose Software** Advanced drawing package operating in Mode 0 for super resolution of Mode 1 for real time colour. Reviewed as "best drawing package on BBC". Powerful "move", "duplicate" and "invert" features are included as well as numerous CAD features. Hundreds now in use. **Disc only £29.90.** Wigmore or AMX mice or RB2 Trackball.



### \* MOUSEPAINT

**Mousepaint** Powerful but friendly introductory graphics package for use with mouse or trackball. Versions available disc or cassette for BBC but cassette only for ELECTRON. Rubber lines, corrected lines, freehand, variable painting, circles, rectangles, ellipses, Mode 1 choice of 4 colours, EPSON print, save, load, fill, hatch fill, text, continuous and dotted lines. **£10.00 incl.**

### \* ARTIST

**Artist** dramatic and sophisticated new BBC pure art package operating in Mode 2 for all 8 prime colours. Every pixel is addressable and one can design any multi-colour paint brush, air bursh or icon. Innovative features include "under and over" (paint above and below other colours) "colour cycling", "colour without" (copy a picture without the background) and animation. Tubelink review "unrivaled and boasts a power undreamed of". "A joy to use" etc. ROM + Disc. **£49.90. incl.** A&B: "Finest graphics aid ever seen".

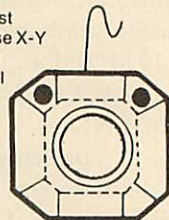


### \* EASICALL

**Easical** (Hardware and Software) Total Telephoning System. Have your own Supersecretary. Store 150 names and phone numbers per disc on BBC and 400 on MASTER. Offline-more. Database s/w selects your phone numbers then automatically dials and re-dials them for you. Use the schedules. Stack up 16 calls at a time – then let it slavishly ring them all – while you are free! **£89.90. incl.**

### \* ANALOGUE TRACKBALL

**Analogue Trackball** The low cost peripheral which provides precise X-Y cursor position control by simple fingertip movement of the central ball. Runs on both BBC and ELECTRON +1. Saves desk space. Use with joystick driven package eg. **MOUSEPAINT** – Accurate and stable. **£18.90 incl.**



**WIGMORE**  
HOUSE LIMITED

32 Saville Row, London W1X 1AG 01-734 8826

Hardware  
p&p £1.50

Access, cheques,  
P.O., Cash



# HINTS & TIPS

**Martin Phillips and Bruce Smith describe ROM arrangements, also indenting with Wordwise, disc drive and disc filing system problems plus printing teletext characters**

## FITTING ROMS MADE EASY

At one time the instructions for fitting ROMs were easy as there was only one computer. Now there are BBC, BBC B+ and Master micros, and fitting ROMs is different for each machine.

When you buy a program in ROM form, it usually comes as a chip stuck onto a piece of black foam. Often, the pins are splayed out, and so will not fit into the socket. Chips are produced like this for commercial manufacturers who fit them using machines, and then solder the whole circuit board by passing it over a wave of molten solder. The splayed pins spring against the side of the holes in the board and so stop the chip falling out before it is soldered. Useful for them, a nuisance for us!

The simple way to overcome the problem is to hold the chip on its side with one set of legs flat against that surface, and then rotate the chip so the pins are bent slightly in. Do this with both sides. It should then fit easily.

You may have heard that chips can be damaged by static voltages, and this thought terrifies many. Although the warnings are sound, the chances of damage are not high. Pins can safely be touched without undue harm. If you want to be really safe, when the cover is removed from the computer, plug the computer into the mains, ensuring that both the computer and wall switch are off and then use the metal top of the power supply to bend the pins over on. This metal case will be earthed, and so should have no high static voltages present.

Sometimes it is necessary to swap the ROMs round so they do not clash with each other. The ROMs are quite difficult to remove. The easy way is to use a thin screwdriver between the ROM and its socket and gently lever one end out. Do this at both ends to avoid bending the pins. Do not lever the ROM against the circuit board, as this can damage the circuit board, or lever the socket out with the chip.

The sockets are a tight fit, and some force is needed to insert a chip. Once the chip is located in the socket, check no pins are bent underneath or splayed outside the socket before pushing it fully home.

Now let's look at the different micros. In

the instructions, it is assumed that you are viewing the computer with the keyboard nearest you.

### Inserting ROMs into the BBC B

1. Ensure the computer is switched off and unplugged at the mains.

2. Remove the four screws holding the cover. Two are located underneath and two are found at the back of the machine. Usually these are labelled 'Fix'.

3. Unscrew the keyboard. Some machines have two screws, some three. Unplug the keyboard connector, and the connector for the speaker.

4. Identify the ROM socket area. This can be found at the bottom right-hand side of the main circuit board (see figure 1 on page 51).

5. Basic is sometimes plugged into socket D on this model (identified by a serial number ending in B01 or B05). If it is, move it to socket A. If a DFS or NFS are fitted, they will occupy another socket.

6. Your ROM can be inserted into any of the remaining sockets. It must have the small notch pointing towards the rear of the board.

7. Refit the keyboard, remembering to connect up the speaker and the main keyboard lead, and refit the cover.

8. Switch on the machine and check all is well. If not check that the keyboard connector is properly in place, or that no pins have been bent on the chip.

### Inserting ROMs into the BBC B+

1. Ensure the computer is switched off and unplugged at the mains.

2. Remove the four screws holding the cover. Two are underneath and two are at the back of the machine.

3. Identify the ROM socket area. This can be found near the top left-hand side of the main circuit board (see figure 2 on page 53). Basic and the operating system occupy the socket next to socket A, and the DFS will usually be in socket A.

4. Your ROM can be inserted into any of the remaining sockets. It must have the small notch pointing towards the rear of the board. Do be careful not to use the two other sockets – these are for the speech processor! At the side of the ROM sockets are some circuit board links. These are numbered links 9, 11, 12, 15 and 18. Set these links to the left for an 8 or 16k

ROM, and to the right for a 32k ROM.

● link 18 is for socket A

● link 15 is for socket B

● link 12 is for socket C

● link 11 is for socket D

● link 9 is for socket E

5. Refit the cover.

6. Switch on the machine and check all is well. If not make sure that no pins have been bent on the chip.

### Inserting ROMs into the Master

Note that it is intended that ROMs for the Master are used in cartridges put into cartridge slots, and not normally in the ROM sockets, though these can be used at the expense of sideways RAM. Apart from the disadvantage of the cost of the cartridge sockets, they have several advantages: an unlimited number of ROMs can be catered for (bye-bye sideways ROM boards and all their problems!), ROM clashes are easily overcome, no fear of damaging the computer trying to fit them. ROMs can easily be swapped between machines.

1. Ensure the computer is switched off and unplugged at the mains.

2. Remove the four screws holding the cover. These are all underneath the machine. They are labelled 'Fix'.

3. Identify the ROM socket area. This can be found at the right-hand side of the main circuit board, just above the two cartridge slots (see figure 4 on page 53). It might be easier to move the plastic base for the cartridge slot – it simply lifts out and can be moved out of the way. Take care that the battery cannot short out on anything.

The operating system, Basic, DFS, *View* and *ViewSheet* are all in one big chip, the 'MegaROM' above socket A. ROM numbers 0 to 3 are normally mapped to the two cartridge slots and ROM numbers 4 to 7 are mapped to the three sockets.

Sockets A and C are 32k sockets and socket B is a 16k socket. Normally the four banks of sideways RAM are mapped to sockets A and C, so to put ROMs in them, links must be changed.

● link 19 is for socket A

● link 18 is for socket C

You should change them to the right to enable the ROM sockets.

4. Your ROM can be inserted into any of the sockets, though for the first 16k chip, clearly



# HINTS & TIPS

socket B should be used. It must have the small notch pointing towards the left-hand side of the board.

5. Refit the cover.

6. Switch the machine back on and check that all is well. If not check that no pins have been bent on the chip.

## MASTER DISC DRIVE PROBLEMS

Early Masters were supplied with the WD1770 disc controller chip. This is the same chip that was fitted into the BBC B+ and caused the loading problems with protected software which was designed to run with the old 8271 disc controller chip. Recently, Acorn changed the chip yet again, this time for the WD1772 disc controller chip. This chip is almost identical except it will not accept a wide range of track-to-track step times for the disc drive and those it will accept are the faster ones. On the BBC B and B+ the disc drive speed could be altered by changing two links on the keyboard. Normally, these links were set to the slowest speed on the BBC micro and increasing them (if using a modern 40 or 80 track drive) made some difference to loading times and also to the clicks and rattles the disc drive made. On the Master these 'links' are now part of the 'configure' routine and are set by \*CONFIGURE FDRIVE. The 1772 controller works faster and old belt-driven drives will not work. Some of the cheap slim-line drives might not work either as they are also belt-driven.

Finding out which disc controller has been fitted is not easy, as it is situated under the keyboard.

\*CONFIGURE FDRIVE should be followed by a number in the range 0-7:

	1770	1772
0 or 4	6ms	6ms
ADFS precompensation		
1 or 5	6ms	6ms
no ADFS precompensation		
2 or 6	30ms	3ms
ADFS precompensation		
3 or 7	30ms	3ms
no ADFS precompensation		

I frankly admit I do not have a clue what 'ADFS precompensation' is.

Problems can occur when using switchable drives in the 40 track mode, or when using 40 track disc drives. The cure is to set the \*CONFIGURE correctly. Once this has been typed in, press CTRL-Break. It should be set to: \*CONFIGURE FDRIVE 0 for a 40 track drive, or if you are going to use a 40/80

drive in the 40 track mode. You should find that \*CONFIGURE FDRIVE 2 will probably also work if you have the 1772 disc controller fitted and are just using an 80 track disc drive. It is better to use the parameter 0, or 1 for more reliable operation and fewer nasty noises from the disc drive.

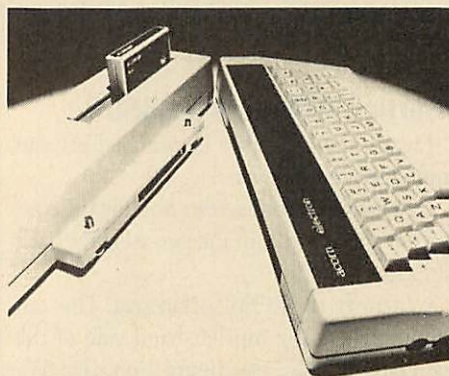
Finally it is worth noting that on a random-access file test of 700 records it was almost impossible to see any difference in speed when the FDRIVE parameter was changed (using a Master with the 1772). However, there was less creaking and groaning from the disc drive when the speed was increased. On a verify test there was a 10 per cent increase in speed between parameter 0 and 2.

## MORE MASTER PROBLEMS

A fault I have encountered several times with the Master is that it will not work with a printer. Again this is a configure problem. If \*CONFIGURE PRINT is set to 0, then the output to the printer is ignored. Set the parameter to 1 for a parallel printer, and 2 for a serial printer.

## THE ELECTRON PLUS 1

Steve Forrester from Sevenoaks, Mr W Brambley from Sudbury and Marchino Sisi from Auchinleck have written in to say that the Plus 1 can be turned off if games will not



The Electron with Plus 1

run with it connected. First press Break and then type the following lines:

```
*FX163,128,1
?&212=&D6
?&213=&F1
?&2AC=0
```

Now load the program. The Plus 1 needs page &D for its workspace and as some games use this workspace, it must be turned off.

## WATFORD DFS

Gordon James from Bristol has written in to ask if there is anything wrong with his disc filing system (DFS) because of the 'can't extend' problem. He will be pleased to hear that there is nothing wrong with the DFS in this respect, as all BBC DFSs suffer from this problem. The Watford DFS is better than most by making a more intelligent choice when finding space to put a file.

Briefly, the problem is that the DFS stores programs on a disc almost like a child writing a story in an exercise book. Now supposing the child does not finish that piece of work, leaves the rest of the page and starts the next page for the new work. That night the child takes the book home to finish the story, only to get to the bottom of the page and the story is still not complete. Where does she/he finish the story? This is the 'can't extend' error. The DFS stores a file on disc (new files always start on a new sector). If the previous file is to be extended, it only has room to fill the remainder of that sector, it then issues the 'can't extend' error.

There is no real solution to this problem. You can save the file by a new name each time, or delete the file first before saving, but this gets to be tedious. As Mr James is using *Wordwise*, he could cure this problem by buying *Wordwise Plus*. *Wordwise Plus* automatically first deletes a file before resaving it.

£10

## PRINTING TELETXT CHARACTERS

Edmundo Herrero from Santa Cruz in Tenerife wins £10 for his listing this month (see yellow pages). Inspired by December's tip on printing user-defined characters, he has sent in a listing to print teletext characters. The teletext characters available in mode 7 are from ASCII values 160 to 191 and 224 to 255.

## INDENTING WITH WORDWISE

*Wordwise* is very easy to use, but as text is added in mode 7 and viewed in mode 0, it is not so simple to format a document correctly. This is particularly a problem when indenting. Many *Wordwise* documents I have loaded in from disc use the expedient of indenting the required amount by simply adding spaces. This tends to be rather tedious because you have to keep previewing the text and then



going back to the editor to get it right. The document is then difficult to edit as adding or deleting words upsets the formatting.

There is an easier way, well at least it is easier when you get used to it, and it does mean that it is not necessary to keep previewing the text.

Dear Sir

I refer to your recent letter and welcome the flattering comments you have made about experts. In reply, I would like to make the following points.

1. It is very difficult to prove that someone is an expert, however it is rather easy to find flaws in their arguments which prove that they are not an expert.
2. An expert is someone who can convince his peers that he or she knows more than they do.
3. Remember how the word "expert" is derived. "Ex" is a has-been, and spurt is a small drip.

Yours faithfully

I Knowitall

### Example 1. A formatted Wordwise letter

Also editing becomes a delight because *Wordwise* will automatically format it. Consider the letter in example 1 above.

<f1> LM15 <f1> LL50 <f1> JD <f2>

Dear Sir

I refer to your recent letter and welcome the flattering comments you have made about experts. In reply, I would like to make the following points.

<f1> IN5 <f2>

<f1> TI2 <f2> 1. It is very difficult to prove that someone is an expert, however it is rather easy to find flaws in their arguments which prove that they are not an expert.

<f1> TI2 <f2> 2. An expert is someone who can convince his peers that he or she knows more than they do.

<f1> TI2 <f2> 3. Remember how the word "expert" is derived. "Ex" is a has-been, and spurt is a small drip.

<f1> CI <f2>

Yours faithfully

I Knowitall

### Example 2. How to format the above letter

This letter can be formatted quite easily by starting new lines and then spacing in to the correct point. A better way is to use indents. These can be either temporary or permanent as shown in example 2.

The letter illustrates the use of both the indenting command and the left margin command. At the start of the letter, the left margin is set to 15 and the line length is set to 50. (The f1 and f2 in the example represent function keys 1 and 2.)

At this point in the letter justification is also switched on. Then after the first paragraph, the rest of the text is indented by five spaces. However, the first line of each new paragraph only needs to be indented by two spaces. Thus a temporary indent is put at the start of each new paragraph. The indents can be cancelled by the CI command.

By indenting this way, should an extra word or sentence be added, *Wordwise* will format it all correctly and ensure that it is justified and this ends all the problems.

## ROM ARRANGEMENTS

Depending on your version of BBC computer the position of the sideways ROM sockets will vary. There are four versions of BBC computer namely the BBC B, the BBC B+ and BBC B+128, the Master Compact and the Master series – on each the ROM sockets are configured in a slightly different way. The Electron does not contain any spare sideways ROM sockets but these can be added by buying a ROM expansion board such as the Slogger ROM Box or the Sidewinder Board.

On the BBC range of computers you will need to remove the case lid to gain access to the ROM slots – doing this will not invalidate your warranty if the micro is still under guarantee.

ROM sockets are assigned numbers – this number refers to the ROM's priority in the micro. The BBC and Electron can support up to 16 ROMs, numbered from 0 to 15. The higher the number, the higher the ROM's priority in the machine. ROM priority is important – when the micro is switched on, the language (ie Basic) which has the highest priority will be selected. By re-arranging ROMs it is possible to make the micro select another language, eg, Logo or View.

Links are small push-on devices that are designed to connect sets of three pronged pins fixed to the main printed circuit board. In many cases they are used to configure ROM sockets in different ways thus a knowledge of them is important. The link will normally connect the centre pin of the three to an outside pin. Links are referred to in geographical

terms, 'east', 'west', 'north' and 'south'. With the keyboard facing you, north is the rear of the machine, south is the front (nearest to you), west is to the left and east to the right. Placing a link in the east position simply means ensuring that the link is across the centre and east (right-hand) pin. Switch the machine off prior to changing links.

### Standard BBC B

On a standard BBC B micro there are just four sideways ROM slots – one will contain the Basic ROM chip, leaving three for user use. If you have a disc interface fitted, it will require a DFS ROM thus reducing those available to two. The sideways ROM slots on a BBC B can be found on the lower right-hand side of the main PCB, just under the right-hand side of the keyboard. You will need to remove this to gain access. Figure 1 shows how they are arranged. The priority of the ROMs from right to left (outside to inside) is 15, 14, 13 and 12 and these may be 8k or 16k ROMs.

ROMs 0 to 11 may be added if desired by installing a ROM expansion board – details of which can be found in the comparative review by Chris Drage in the May 1986 *AU*.

### BBC B+

On a B+ micro there are six sideways ROM sockets, located to the top left (back) of the PCB, arranged in two rows. Each of these sockets has a 32k capacity and occupies two ROM slot positions, therefore there appear to be 12 ROM slots to the MOS. Basic and MOS are combined into a single chip, OS-Basic, and this is fitted into the right-hand socket on the top row. This socket has priority number 15 and 14. Because this chip can-

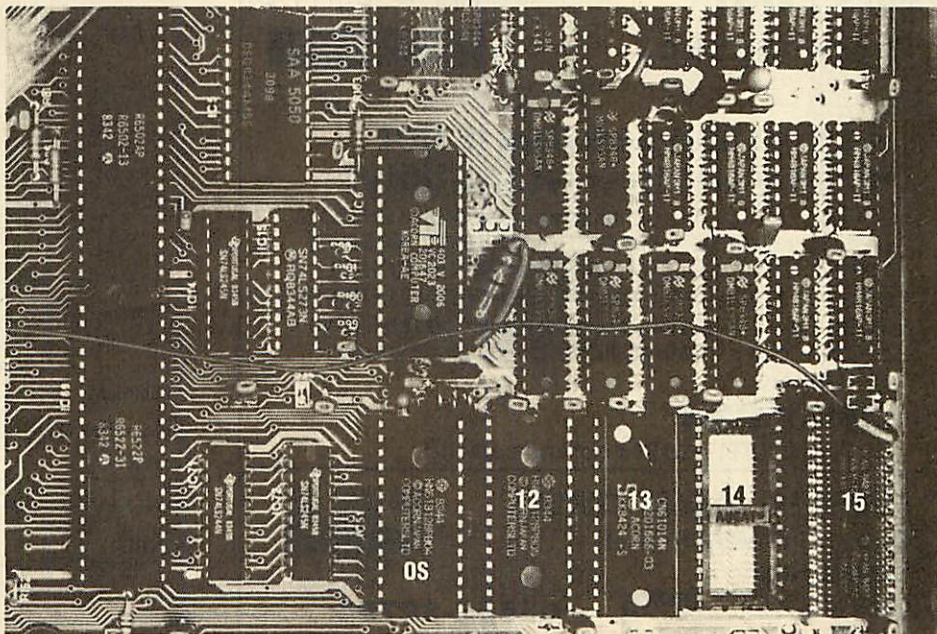


Figure 1. The four sideways ROM slots on the BBC B



**NEW  
HARDWARE  
LAUNCH**

NEW PRODUCTS FROM PMS

**BBC AND ELECTRON  
6502 SECOND PROCESSORS**  
ADD 64K OF RAM AND  
SECOND PROCESSOR POWER  
FOR UNDER £100

- 30K Basic Programs in *all* modes
- 3 Times more text in view (mode 3)
- 45K free in Hi-Languages
- 60K available to machine code
- Brings Electron up to BBC Speed
- No modifications required

The PMS second processor plugs into the BBC Tube (plus 1 on Electron), and will run software obeying Acorn Tube Protocols. This includes Basic, the whole View family, Pascal, Comal, Lisp and Hi-BASIC available from P.M.S. For more details contact PMS.

BBC version  
**£99.95**  
Electron **£89.00**  
(including VAT)  
and £2 post & packing

**NEW  
ROM**

## PMS MULTI-FONT NTQ

Near Text Quality Typesetting Software  
use with any wordprocessor or language  
Runs on a BBC B or Master with Epson RX/  
FX compatible printer.

No other hardware required  
obtain printed output of a quality hitherto  
unknown

**Use all these in ONE line of text**

**MULTIPLE HEIGHTS AND WIDTHS**  
(up to 16 x normal)

- \* FONTS
- \* HEIGHTS
- \* INVERSE and SHADED TEXT
- \* LINE SPACING
- \* MICRO-JUSTIFICATION - right and left justifies proportionally spaced text
- \* DRAFT mode - for fast, rough copy for proof reading - but with ALL NTQ features

NTQ comes in a 2 ROM set - one ROM containing the NTQ software and 3 fonts, the other containing a further 4 fonts. Any number of FONT EXTENSION ROMs can be added. USER FONTS created by the definer software supplied can be stored in ANY bank of sideways RAM or burnt into a ROM.

SAMPLE OF THE FONTS

STANDARD TYPE  
ISONORM  
COMPACTA BLACK  
BOOK TYPEFACE  
ROUNDEAN  
HITECH  
GOTHIC  
BROADWAY ENGRAVED  
BOLD TYPE  
WILD WEST



**MULTI-HEIGHT  
MULTI-FONT**

**MULTI-WIDTH**

**BACKGROUND**

**MULTI-PITCH**

**INVERSE**

**UNDERLINING**

**As you can see this is not simply another NLQ utility!**

Whether you use your printer to produce WORKSHEETS, MENUS, LEAFLETS, TICKETS, LABELS, CONCERT PROGRAMMES, POSTERS, SCHOOL/CHURCH/CLUB NEWSLETTERS, PRICE LISTS, HEADED NOTEPAPER, BUSINESS CARDS or you simply want to add style to your personal letters - PMS Multi-Font NTQ is what you have been looking for.

**ONLY £34**

(including VAT) add £1 post and packing

**PERMANENT MEMORY SYSTEMS**  
38 MOUNT CAMERON DRIVE  
ST LEONARDS  
EAST KILBRIDE  
G74 2ES



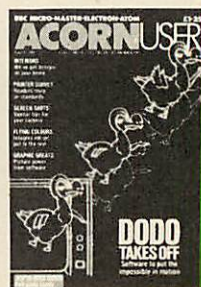
**03552-32796**  
(24 Hour)



AA292

# 3 ISSUES OF ACORN USER MAGAZINE

# FREE



## 15 ISSUES FOR THE PRICE OF 12

This offer is only open to addresses in U.K. and Eire.

You will be entitled to receive 15 scintillating issues of *Acorn User* magazine for the price of 12, when you subscribe using the coupon below. Don't hesitate. Send in your order now, while this really special offer lasts!

YES! Please start my 15-issue magazine subscription to *Acorn User* from the \_\_\_\_\_ issue and send it to the following address:

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

POSTCODE \_\_\_\_\_

☐ I enclose my cheque/postal order for £17.50 made payable to Redwood Publishing

☐ Please debit £17.50 from my Access/Barclaycard/American Express

Account No: \_\_\_\_\_

Expiry date \_\_\_\_\_

SIGNED \_\_\_\_\_

DATE \_\_\_\_\_

Send this coupon with your remittance in an envelope to **Christine Allen, Subscriptions Manager, Redwood Publishing, Lambourn Woodlands, Newbury, Berkshire RG16 7TW.**

HA17



# HINTS & TIPS

not be physically moved to another ROM slot, a mechanical means exists whereby its priority can be changed. This simply involves changing link 13's position on the printed circuit board. This will assign ROM priority 0 and 1 to the OSBasic chip.

The other five ROM sockets (labelled A,B,C,D and E) have the following priority numbers:

Key	ROM Socket	Link
A	10 and 11	18
B	8 and 9	15
C	6 and 7	12
D	4 and 5	11
E	2 and 3	9

Sockets 12 and 13 are not included and no provision has been made for them. As a DFS ROM is also included with the B+ only four

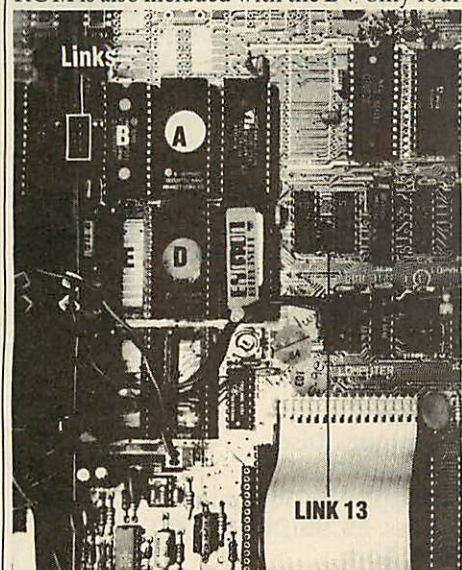


Figure 2. Five of the ROM sockets on the BBC B+

of the six sockets are available for use.

ROMs may be either 32k or 16/8k capacity and this must be selected via a link setting. There are five in all and the slots they affect are listed above. Normally these slots are set west in which case the ROM slots are in the 16/8k configuration and the odd priority number is assigned. By setting the link east, the 32k configuration is selected and both ROM identities are assumed.

## The Master Compact

There are five ROM slots in the Master Compact. These are located down the lower right-hand edge of the PCB. The bottom-most socket contains a 64k ROM which houses the MOS, Basic and ADFS. Typing \*ROMS shows that these occupy slots 15, 14 and 13 (&F,&E and &D in hexadecimal) as UTILS, Basic and ADFS.

The socket immediately above the OSBasic/ADFS chip is configured as a 32k socket and has ROM priority number 0 and 1.

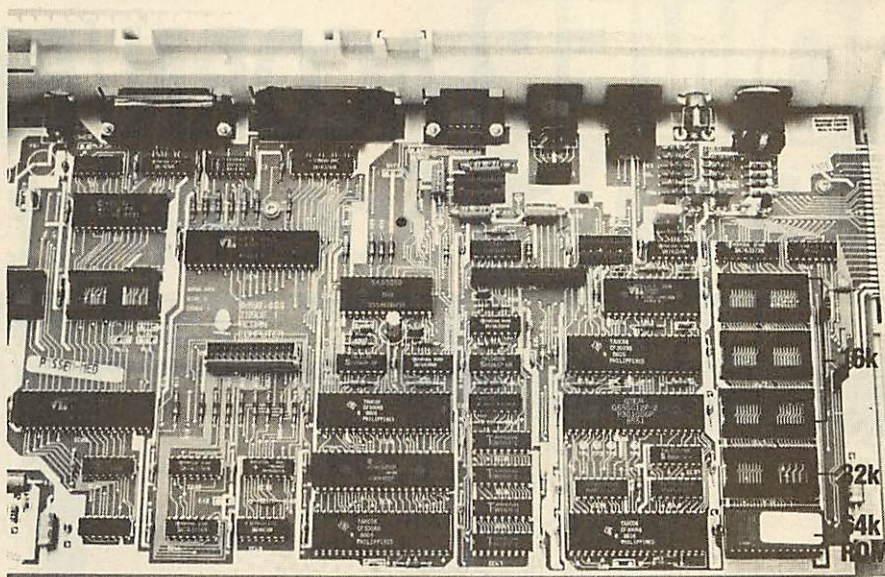


Figure 3. The 16k, 32k and 64k Master Compact ROMs

The remaining three sockets are all 16k sockets numbered 2,3 and 8.

Sideways RAM occupies ROM slots 4,5,6 and 7. Slots 9,10,11 and 12 are not normally available and would only appear in any future issue 64k ROM, for example upgrading to a 128k ROM.

## Standard Master

There are just four ROM sockets on a standard Master series micro and these are located to the lower right-hand side of the PCB (just above the keyboard). The upper most of these will house the Megabit ROM which contains the MOS, Basic, ADFS, DFS, Edit and View, these occupy ROM slots 15,14,13,12,11,10 and 9 (&F-&9).

Figure 4 shows the position of the other three ROM slots and these are labelled A, B and C. The items in figure 4 labelled D and E are the cartridge slots. Both cartridge slots can take two 16k ROMs and they are given ROM priority numbers 0,1,2 and 3. Slot number B has ROM priority 8 and is the only dedicated 16k ROM slot in the Master.

The remaining two slots A and C are both 32k and take ROM priority 4/5 and 6/7. However the 64k of sideways RAM supplied in the Master is normally mapped in this position to allow 4\*16k slots of sideways RAM images and as such the ROM slots themselves cannot normally be used. If the ROM sockets are required for use the sideways RAM can be 'removed' by setting link 18 (socket C) and link 19 (socket A) to the east position. These links are marked on the picture. Sideways RAM can be re-enabled by setting the links to the west position. Note that it is possible to mix ROM and RAM by changing just one link setting.

## Electron ROM slots

The Electron does not contain any spare ROM slots for use, however they can be added. If you have a Plus 1 then a ROM cartridge may be purchased from Advanced Computer Products - this will enable 8k or 16k ROMs to be inserted via the cartridge.

If you do not have a Plus 1 then the Slogger ROM Box will give you not only several ROM slots but also the two cartridge slots, or the Sidewinders board may be used.

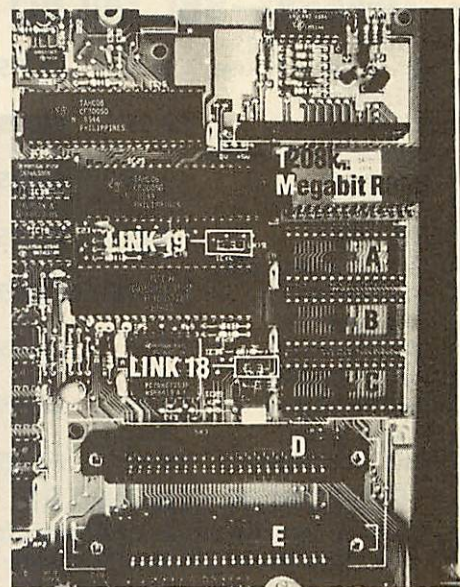


Figure 4. Master ROMs and cartridge slots

## PRINTER COMMAND PERFORMANCE

You can select printer functions *before* loading a wordprocessor, so that an alternative print style can be used - useful with View where it's not easy to embed printer commands into the text.



# MICRO POWER LEEDS

# Yorkshire's leading ACORN/BBC Specialist

Approved Repairs &  
Econet Centre

## ACORN/BBC MASTER COMPACT

AVAILABLE  
NOW

Master Compact 128K + 640K  
3.5 inch Disc Drive only **£399 + VAT**

Master Compact 128K + 640K  
3.5 inch Disc Drive + High Res. Mono Monitor **£469 + VAT**

Master Compact 128K + 640K  
3.5 inch Disc Drive + Med. Res. Colour Monitor **£599 + VAT**

### MASTER COMPACT SOFTWARE!!

We will be stocking virtually every  
software product available at  
**Compact Launch.**  
Send now for full list.  
Doctor Who and the Mines of Terror —  
**£9.95**  
MicroPower Magic —  
10 game compilation **£9.95 ONLY**

BBC Master 128K **£435.22 + Vat**  
Turbo Upgrade **£109.35 + Vat**  
512K Module **£348.26 + Vat**

### Disc Drives

Acorn ADD 03 800K **£274.78 + Vat**  
Pace Drives from **£95.00**  
Cumana Drives from **£99.96**  
(See our Special prices on 5.25 inch  
disks)

### Printers

Citizen 120D (120 cps inc.  
tractor) **£199.00 + Vat**  
Citizen LSP10 **£216.52 + Vat**

### Monitors

We carry the latest models from  
Philips, Taxan, Thompson, Hantarex  
etc.

### SPECIAL PURCHASE

10 DISCS IN FLIP OPEN PLASTIC CASE  
Single sided, double density.  
**ONLY £8.70 + Vat**

### High Tech Products from ACORN COMPUTERS:—

View WP Rom	<b>£59.80</b>
Viewstore Rom	<b>£59.80</b>
Views 3.0 Rom	<b>£89.70</b>
Hi-view Disc	<b>£59.80</b>
Viewsheet Rom	<b>£59.80</b>
Viewspell Rom	<b>£39.95</b>
View Index Disc	<b>£14.95</b>
Database Disc	<b>£15.35</b>
Printer Driver Generator	
Cass. £9.95/Disc <b>£11.50</b>	
Forth Rom	<b>£49.85</b>
Forth Disc	<b>£19.90</b>
Master Lisp C. Rom	<b>£59.80</b>
Lisp Rom	<b>£49.85</b>
Lisp Disc	<b>£19.90</b>
MicroProlog Rom.	<b>£79.95</b>
Master ISO-Pascal C. Rom	<b>£69.00</b>
ISO-Pascal Rom	<b>£69.00</b>
ISO-Pascal S.A.G. Disc	<b>£34.95</b>
Comal Rom	<b>£49.85</b>
Basic Editor Rom	<b>£29.90</b>
Termulator Rom	<b>£34.50</b>
Master Logo C. Rom	<b>£69.00</b>
Logo Rom	<b>£69.00</b>
BCPL Rom	<b>£59.80</b>
BCPL Calculations Disc	<b>£34.50</b>
BCPL S.A.G. Disc	<b>£49.90</b>
6502 Development Pack Disc	<b>£49.85</b>
GXR Model B Rom	<b>£29.90</b>
GXR Model B+ Rom	<b>£29.90</b>
MICROTEXT DISC	<b>£59.80</b>
MICRO TEXT PLUS ROM	<b>£253.00</b>

## STOCK CLEARANCE

### OFFERS—BBC MICRO

Lord of the Rings (Melbourne House)	<del>£15.95</del>	<b>£9.95</b>
Rebel Planet (US Gold)	<del>£9.95</del>	<b>£5.95</b>
Cosmic Battle Zones (US Gold)	<del>£9.95</del>	<b>£5.95</b>
Bounty Bob (US Gold)	<del>£9.95</del>	<b>£5.95</b>
The Complete BBC (Audiogenic)	<del>£19.95</del>	<b>£11.95</b>
Bug Eyes (Audiogenic)	<del>£7.95</del>	<b>£4.95</b>
Picture Builder (Hill McGibbon)	<del>£9.95</del>	<b>£5.95</b>
Friend & Foe (Hill McGibbon)	<del>£6.95</del>	<b>£4.95</b>

### ELECTRON SOFTWARE

We have Massive Stocks of Acornsoft  
and Micro Power Electron Software  
— all at reduced Prices!!

Ring for details.

Official Orders from Local Authorities/Govt.  
depts. etc. welcome.

Write or phone for quotations.

Carriage. UK. £5.00 per item on hardware,  
all other items 0.95p/order.  
Export carriage at cost.

## MICRO POWER'S GREATEST HITS

### Doctor Who & the Mines of Terror

BBC B+ /Master 5.25 inch Disc  
**£9.95 JUST RELEASED!!**

BBC B (16K ROM + DISC)	<del>£19.95</del>	<b>£9.95</b>
BBC B (16K ROM + DISC)	<del>£18.95</del>	<b>£8.95</b>
Castle Quest DISC	<del>£14.95</del>	<b>£7.95</b>
Castle Quest CASS.	<del>£12.95</del>	<b>£6.95</b>

Northwood House, North Street, Leeds LS7 2AA. Tel: (0532) 458800/434006  
Showroom open 9.00 a.m. to 5.30 p.m. Tuesday to Saturday. Mail Order — Ring Monday to Friday.

# MICROPOWER



# FIRST BYTE

## THE MOS EFFECT

This month we look at how to use the operating system and machine codes

**Tessie Revivis**

One of the most notable features of the BBC micro and Electron computers is their accessibility – virtually anything you want to do at machine level, you can. By machine level, I am really talking about the Machine Operating System – more commonly referred to as the MOS. The MOS is always present and acting in your micro and is independent of the task or language being run. In fact any program or language – be it playing *Repton* or writing a Basic program, relies on the MOS being present. The MOS for example is responsible for handling the screen display, printing characters on the screen, reading and recognising a key press on the keyboard, inputting text into a program or even a word-processor – in fact it would almost be true to say that languages such as Basic are being run by the MOS!

To allow all languages and machine code programs (not Basic programs as these interlink with the MOS via Basic) to use the facilities ready built into the MOS, a variety of entry points are built into the system. It is worth taking the time out to learn what functions the MOS provides, simply as it can save you time and effort in writing the assembly code to do it! For example, consider the single line Basic program:

```
10 key=GET
```

If you run this, the program will wait for you to press any key on the keyboard. Simple enough, but how would you write this in assembly language for incorporation into a machine code program? The answer is, you don't! You use the Operating System Read Character routine (OSRDCH) in the MOS. This routine is located at address &FFEO, so all we need to do is a JSR &FFEO as the following program (listing 1) demonstrates.

```
10 REM First Byte listing 1
20 REM Simulate GET
30 :
40 DIM code% 100
50 P%=code%
60 L:key
70 JSR &FFEO
80 RTS
90 J
100 CALL key
```

**Listing 1. Simulating Basic's GET**

Type this in, RUN it and the effect is exactly the same as our one-liner earlier on.

In the previous two months we have used a couple of other MOS based routines, namely to print the character currently in the accumulator, this was done with one of the following two calls, JSR &FFEE or JSR &FFE3. Respectively, these are the Operating System Write Character routine (OSWRCH) and the Operating System ASCII character routine (OSASCI). They are, in effect, identical except that the latter should be used if you wish to print a Return on the screen with ASCII code 13 in the accumulator. Listing 2 below illustrates the printing of the letter A utilising the OSWRCH routine.

```
10 REM First Byte listing 2
20 REM Print with OSWRCH
30 DIM code% 100
40 P%=code%
50 L:print
60 LDA #ASC"A"
70 JSR &FFEE
80 RTS
90 J
100 CALL
```

**Listing 2. Using OSWRCH to print a character**

An easy way of generating a line space is the OSNEWL routine (Operating System New Line). This is done by calling address &FFE7 in your program, ie JSR &FFE7. Add the following line to listing 2 above:

```
65 JSR &FFE7
```

and run it again to see that an extra blank line is indeed generated.

Another useful routine to have knowledge of is the Operating System Command Line Interpreter routine (OSCLI) at &FFF7. OSCLI allows you to access any of the \* commands that your micro may be capable of from machine code. As with all OS commands it is easy to use. There are just two things to remember. First, the OS command minus the \* and terminated by an ASCII return character, ie 13, must be placed in the memory and secondly the index registers X and Y must be made to point to the string. With this done the routine can be called and the task performed. Listing 3 demonstrates OSCLI to perform a \*HELP. The command

Help (minus the \*) and followed by a 13 (Return) character are stored at 'command' (lines 90 to 150). The index registers are pointed to this (lines 50 and 60) so that the low byte of the Help strings address is in the X register and the high byte in the Y register – this is aided by use of the MOD and DIV functions – note also the use of immediate addressing (see last month's First Byte). The JSR &FFF7 then performs the \*HELP. Try it and see. Substitute your own command string in line 110 to experiment, ie CAT to catalogue a disc. If you have *UserDump* or *UserROM* you can use their facilities in this way from machine code – or in fact those of any other sideways ROM you may have!

```
10 REM First Byte listing 3
20 REM Perform OSCLI
30 DIM code% 100
40 FOR pass=0 TO 3 STEP 3
50 P%=code%
60 LOPT pass
70 .oscli
80 LDX #command MOD 256
90 LDY #command DIV 256
100 JSR &FFF7
110 RTS
120 .command
130 J
140 $P%="HELP"
150 P%=P%+LEN$P%
160 ?P%=13
170 NEXT pass
180 CALL oscli
```

**Listing 3. Performing a '\*' command**

Osbyte calls allow you to control individual components of the way in which your micro functions – you may also use them to gain information about your particular machine. Osbyte calls are normally available from the keyboard or from a program by use of the \*FX command. There are many Osbyte calls and so each is allocated a number starting at 0 up to 255 – not all are used though. For example type the following at the keyboard:

```
*FXO
```

when you press Return the version number of your OS (MOS) will be displayed. On my BBC it returns:

```
OS1.20
```

If you have an Electron, B+ or Master the number will be different. All the OS routines,



# ACORN<sup>SOFT</sup> ELECTRON BONANZA

# AMAZING OFFERS

**VIEW** WORDPROCESSING  
CARTRIDGE

~~£29.95~~ **£14.95**

**VIEW**

**SHEET**

SPREAD SHEET  
CARTRIDGE

~~£29.95~~ **£14.95**

● OR ONLY **£24.95** FOR BOTH

## PRIMARY EDUCATION

## HOME INTEREST

## BUSINESS

Sentence Sequence ~~£6.99~~  
Word Sequence ~~£6.99~~  
Missing Signs ~~£6.99~~  
Number Balance ~~£6.99~~  
Talk Back ~~£6.99~~

Workshop ~~£6.99~~  
Tree of Knowledge ~~£6.99~~  
Peeko Computer ~~£6.99~~  
The Complete Cocktail Maker ~~£6.99~~  
Paul Daniels Magic Show ~~£6.99~~

Desk Diary ~~£6.99~~  
Personal Money Management ~~£6.99~~  
Business Games ~~£6.99~~  
Graphs & Charts ~~£6.99~~  
Creative Graphics ~~£6.99~~

● SELECT ANY FIVE FOR ONLY **£7.95**

## EDUCATION+

Linkword German ~~£14.95~~  
Linkword Spanish ~~£14.95~~  
Linkword Italian ~~£14.95~~  
I DO ~~£12.65~~

Maths 'O' Level I ~~£12.65~~  
Maths 'O' Level II ~~£12.65~~  
Biology ~~£12.65~~  
English ~~£12.65~~

Magic Mushrooms ~~£11.95~~  
Lisp Cassette ~~£9.95~~  
Turtle Graphics Cassette ~~£9.95~~  
Theatre Quiz ~~£12.95~~

● ANY TWO FOR **£5.95**

## MICROPOWER GAMES

Bandits at 3 O'clock ~~£6.95~~  
Adventure ~~£7.95~~  
Swag ~~£6.95~~  
Escape from Moon Base ~~£7.95~~  
Ghouls ~~£7.95~~  
Electron Invaders ~~£7.95~~

Felix and the Fruit Monsters ~~£7.95~~  
The Mine ~~£7.95~~  
Felix in the Factory ~~£7.95~~  
Croaker ~~£7.95~~  
Bumble Bee ~~£7.95~~  
Frenzy ~~£7.95~~

Gauntlet ~~£7.95~~  
Killer Gorilla ~~£7.95~~  
Rubble Trouble ~~£7.95~~  
Swoop ~~£7.95~~  
Chess ~~£7.95~~  
Jet Power Jack ~~£7.95~~

● ANY FIVE FOR ONLY **£7.95**

## ROM CARTRIDGES

Logo Cartridge ~~£59.95~~ **£39.95**  
ISO Pascal Cartridge ~~£59.95~~ **£39.95**  
LISP Cartridge ~~£29.95~~ **£9.95**  
Starship Command ~~£14.95~~ **£2.95**  
Countdown to Doom ~~£14.95~~ **£2.95**

## ELITE

plus 3 Games Disk ~~£12.95~~ **£10.95**  
Me and My Micro ~~£19.95~~ **£9.95**  
Book and Cassette ~~£12.95~~ **£2.95**  
Advanced User Guide ~~£9.95~~ **£2.95**

CHEQUES PAYABLE TO MICRO  
POWER. GOODS DESPATCHED  
WITHIN 48 HRS. PRICES INCLUDE  
V.A.T. ACCESS VISA. SEND YOUR  
ORDER TO: MICRO POWER LTD.,  
NORTHWOOD HOUSE, NORTH  
STREET, LEEDS LS7 2AA.  
DEALERS ENQUIRIES WELCOME  
TEL: 0532 458800/434006

Name

Address

PLEASE ADD 0.95p P&P



Micro Power Limited, Northwood House, North Street, Leeds LS7 2AA

# MICROPOWER



# FIRST BYTE

and Osbyte (FX) calls can take place from machine code – the address of the routine is at &FFF4, and prior to it being called, the FX number should be placed in the accumulator. \*FX0 in assembler is shown in listing 4.

```
10 REM First Byte listing 4
20 REM Perform *FX 0
30 DIM code% 100
40 P%=code%
50 [.fx0
60 LDA #0
70 LDX #0
80 LDY #0
90 JMP &FFF4
100 J
110 CALL fx0
```

**Listing 4. Displays operating system number**

Other FX calls have far more practical applications. \*FX3 allows you to enable or disable an output stream – this being simply a flow of information from the computer. The VDU driver for instance is an output stream, as it sends signals to your TV or monitor. This particular stream can be disabled with the command \*FX3,2. Don't type that in yet, first define two function keys thus:

\*KEY0 \*FX3,2:M

\*KEY1 \*FX3:M

Press f0 and no further information is sent to the screen – the computer will still function however – press f1 to restore the status quo. In this case we have used an extra parameter in the FX call, in fact we can use up to three parameters. In assembler the first number represents the accumulator contents, the second the X register contents and the third, if any, the Y register contents. In assembler the command \*FX3,2 is performed as shown in listing 5 below.

```
10 REM First Byte listing 5
20 REM Perform *FX 3,2
30 DIM code% 100
40 P%=code%
50 [.fx3
60 LDA #3
70 LDX #2
80 LDY #0
90 JMP &FFF4
100 J
110 CALL fx3
```

**Listing 5. Disabling the screen number**

Another interesting (and good for pranks) \*FX call is \*FX11 – this can be used to vary the rate at which the keyboard will auto-repeat. Normally when you keep a key depressed it will be repeated after 32 hundredths of a second – lowering this figure makes it impossible to type properly – try \*FX11,1 (its worth defining a function key with \*FX11,32 first!).

Some FX calls can be used to simulate Basic

functions at machine level. For example \*FX129 performs an INKEY. Here the INKEY value must be passed to the MOS via the index registers.

The following assembler program (listing 6) performs the equivalent of INKEY (&7FFF), ie, it waits for up to five and a half

```
10 REM First Byte listing 6
20 REM Simulate INKEY
30 DIM code% 100
40 P%=code%
50 [.inkey
60 LDX #&FF
70 LDY #&7F
80 LDA #&B1
90 JSR &FFF4
100 RTS
110 J
120 CALL inkey
```

**Listing 6. INKEY simulation**

minutes for a key to be pressed.

Some FX calls can also return two items of information using the X and Y registers. \*FX135 for instance will return the value of the character under the cursor and the current mode number via the X and Y registers respectively. The value of the character is in fact its ASCII code. This is a most useful call and

```
10 REM First Byte listing 7
20 REM Read Mode, Character
30 DIM code% 100
40 P%=code%
50 [.key
60 LDA #&B7
70 JSR &FFF4
80 STX &70
90 STY &71
100 RTS
110 J
120 @%=0
130 MODE 131
140 PRINT"ABCDEFGHIJK"
150 VDU 30
160 CALL key
170 PRINT"
180 PRINT"Ascii Code:&~?&70
190 PRINT"Mode number:"?&71
```

**Listing 7. Reading a screen character**

listing 7 shows how it is implemented.

There are another set of MOS calls available for use – these are the Osword calls and the routine lies at address &FFF1. These calls are used to transfer blocks of information via a parameter block. The parameter block must be defined and set up as required before the routine is called. The X and Y registers are used to pass the start address of the parameter block while the accumulator holds the Osword Call number.

Listing 8 shows how Osword call can be used to perform the equivalent of the SOUND command – the program in fact does SOUND 1,-15,200,20.

The parameter block in the program is the position after the main assembler – which is again very simple to set up – the BRK mnemonic

```
10 REM First Byte listing 8
20 REM SOUND 1,-15,200,20
30 DIM code% 100
40 FOR pass=0 TO 3 STEP 3
50 P%=code%
60 [OPT pass
70 .osword1
80 LDX #sound MOD 256
90 LDY #sound DIV 256
100 LDA #7
110 JSR &FFF1
120 RTS
130 .sound
140 BRK:BRK
150 .amplitude
160 BRK:BRK
170 .pitch
180 BRK:BRK
190 .duration
200 BRK:BRK
210 J
220 NEXT
230 !sound=1
240 !amplitude=-15
250 !pitch=200
260 !duration=20
270 CALL osword1
```

**Listing 8. Simulating Basic's SOUND**

nic is used simply to reserve a single byte, as each item requires two bytes of space two BRK's are used. The opcode for BRK is &00, so is quite convenient. Finally the ! operator is used to write the information into the parameter block prior to executing the call.

The programs and examples presented so far are very insular in that they really perform just a single specific operation – the real fun comes when playing with the information extracted. Normally, when letters are presented on screen each letter occupies the same amount of space. The letter l uses up the same amount of screen space as the letter M which is clearly much bigger. A much more presentable type can be obtained using proportional characters – here the letter l takes up less room than the letter M and gives a much neater appearance. Listing 9 (on the yellow pages) uses Osword call 9 to read a letters definition and strip off any unwanted spaces either side of it before plotting it on screen (it does not work in Mode 7). The end results are, I think you'll agree, very nice!

To use the Osbyte and Osword calls you will need to have access to a book describing them. The Electron, BBC B and BBC B+ manuals all outline the more important calls – the *Advanced User Guide* (Bray, Dickens and Holms) or the *BBC Advanced Reference Guide* (Smith) are useful and both contain more detailed lists. For Master owners then the *Reference Guide Part 1* contains full details on all the MOS routines.



# Watford Electronics



Jessa House, 250 Lower High Street, Watford WD1 2AN, England

Tel: Watford (0923) 37774/40588 Telex: 8956095 WATFRD

Credit Card Orders (ACCESS & VISA) Tel: (0923) 33383 or 50234 (24 Hours)



All prices exclusive of VAT; subject to change without notice & available on request.

<b>BBC MASTER 128K Micro</b>	<b>£395</b>
<b>BBC MASTER TURBO 4MHz</b>	<b>£510</b>
512K Add on Board	<b>£335</b>
TURBO Add-on Module	<b>£99</b>
BBC MASTER ET (Econet Terminal)	
	<b>£320</b>
Econet Module for the Master	<b>£43</b>
ROM Cartridges for Master	<b>£13</b>
Reference Manual I (No VAT)	<b>£15</b>
Reference Manual II (No VAT)	<b>£15</b>
Advance Ref. Manual (No VAT)	<b>£19</b>
64K Upgrade Kit for B+	<b>£32</b>
Acorn 1770 DFS Upgrade Kit	<b>£42</b>
ECONET Upgrade Kit for BBC	<b>£42</b>
ECONET UPGRADES Available	

## SPECIAL OFFER

*Gemini's popular OFFICE MATE & OFFICE MASTER Software Packages on Disc consisting of: Database, Spreadsheet, Beebplot Graphics, Wordprocessor, Accounts, Packs: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, Stock Control*

**FREE**

*with every BBC B+ & MASTER purchased from us.*

6502 Acorn 2nd Processor package	<b>£160</b>
Z80 Acorn 2nd Processor package	<b>£319</b>
ARIES IEEE Interface	<b>£238</b>
Acorn IEEE Interface Complete	<b>£280</b>
Acorn Teletext Adaptor	<b>£125</b>
Acorn Prestel Receiver	<b>£115</b>
Acorn Bitstick I	<b>£299</b>
Robocom Bitstick II	<b>£759</b>
Upgrade for Bitstick I to II	<b>£450</b>
Bitstick Multiplexer Driver	<b>£65</b>

## TORCH PRODUCTS

ZEP 100 Z80 2nd Processor complete with PERFECT suite of software	<b>£229</b>
ZDP 240 Z80 2nd Processor, PERFECT Software and Twin 800 cased Side by Side Disc Drives	<b>£478</b>

(Securicor carriage £7)

**By popular demand our retail shop is now open till 8.00pm every Thursday.**

## VARIOUS PRINTERS

● EPSON FX85 Printer	<b>£315</b>
● EPSON FX105 Printer	<b>£435</b>
● EPSON JX-80 Colour Printer	<b>£420</b>
● EPSON Hi-80 Printer Plotter	<b>£319</b>
● EPSON Paper Roll Holder	<b>£17</b>
● EPSON LX80 Printer	<b>£189</b>
● EPSON LX80 Tractor	
Feed Attachment	<b>£20</b>
● EPSON LX80 Single Sheet Feeder	<b>£49</b>
● SEIKOSHA GP50A & GP50S	<b>£69</b>
● Centronics Printer Cable to interface all the above Printers to BBC	<b>£6</b>
(Securicor carriage charge on printers £7)	

## RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	<b>£27</b>	RS232 + 2K Buffer	<b>£55</b>
IEEE 488	<b>£65</b>	RS232 + 8K Buffer	<b>£75</b>



We are proud to be able to bring you an "Advanced Scoop" of COMPACT the new micro from Acorn Computers. COMPACT is the first truly European micro for the Home and Education. It certainly looks the best computer for a first time buyer that there is. Over 40,000 COMPACTs had already been sold (many in Europe) before it was even launched; it's that good!

COMPACT is compatible with many of the advanced, Master 128's features and has been designed to follow on where the BBC B and Electron left off. Available now, (at the time of the launch), from both Acorn and various third parties there are well over 150 applications softwares packages.

COMPACT has been designed as a simple, plug in and go machine. It is supplied complete with software and an integral 3.5" disc drive. Three different packages are available (see below). Of course, we can tailor this to suit your needs from our wide range of hardware peripherals, to include such things as printers and different monitors, etc.

When switched on COMPACT can provide a simple to use pull down menu environment for the first time user. This gives access to a new version of View (an award winning word processor), a card index program, Logo and another, more simple word processor for immediate education, not to mention powerful and advanced disc storage system. The latest version of the powerful and popular BBC Basic, a large suite of Welcome programs & utilities, all come FREE. And last, but not the least, via the pull down menus, a note pad and a calculator.

For experienced users, COMPACT can be configured to power up a variety of different modes. Shadow and Sideways RAM compliment the normal RAM. Speed wise, the standard benchmark programs run 13% faster than the Master 128, which is about 3-4 times faster than the IBM PC runs them!

Why not visit our shop premises for a demonstration and satisfy yourself before you buy. Compact is available in three combinations. All options comprise of the main system unit, separate keyboard and an integral 3.5" disc drive.

"COMPACT is bound to make an IMPACT"

System 1 COMPACT without monitor	<b>£399</b>
System 2 COMPACT with monochrome monitor	<b>£469</b>
System 3 COMPACT with colour monitor	<b>£599</b>

## INTRODUCTORY OFFER

As an introductory offer, we are offering the View Printer Driver Rom and Computer Concepts Interword Rom absolutely free for any compact bought from us in September.



Official ACORN Distributor

## CENTRONICS GLP & Brother M1009 (NLQ) Printers

A major price break-through in NLQ Printers from Watford.

At last, a full feature Epson compatible NLQ printer at a price that everyone can afford. Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

The Centronics GLP printer which is manufactured by BROTHER (and also marketed by them under their own brand name M1009), features a Near Letter Quality (NLQ) mode using a 23 by 18 dot matrix for each NLQ character (this is the same as is used by the very popular Kaga Taxan printers). The NLQ Font Rom supplied is Watford's own Professional NLQ ROM for the GLP/M1009.

Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

Handles upto 9" wide paper. Friction feed standard, tractor feed optional extra.

GLP is bidirectional logic seeking. Has a 9 needle print head. 50 CPS. Parallel interface only.

**Special Offer £95 (carr £5)**  
**Tractor Feed Attachment £5**

## Centronics GLP Mk2 (Brother M1109) NLQ Printer

100 CPS. (25 in NLQ mode), Bi-directional, logic seeking, Friction feed, tractor feed optional extra, 2K Buffer. Has both Centronics parallel and RS232 both as standard. Simply at the flick of a DIP switch, the Mk2 printer swaps between full IBM or Epson compatibility.

**Launch Price: £139 (carr. £5)**  
**Tractor Feed Attachment £5**

## BROTHER HR-15XL (NEW IMPROVED FAST HR-15XL)

The new improved Brother HR15XL is a very high quality and very fast daisy-wheel printer for serious use. Notable features of this printer include a 3k buffer, 20cps, bi-directional proportional spacing, Centronics interface standard, (RS232 optional), optional Sheet Feeder and Keyboard.

**ONLY £285 (carr. £7)**

TRACTOR FEED Attachment	<b>£84</b>
<b>Ribbon Cartridges:</b>	
Fabric £3; Carbon £3; Multistrike	<b>£5</b>
DAISYWHEELS (various typefaces)	<b>£18</b>

## PRINTER SHARERS

(Ideal for School environment)

Connect 3 BBC Micros to 1 Printer	<b>£60</b>
Connect 6 BBC Micros to 1 Printer	<b>£129</b>
<b>PRINTER CHANGER</b>	
Connects 3 Printers to 1 Micro	<b>£65</b>
(Cables extra)	



## SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

**2764-250ns £2.00**

**27128-250ns £2.40**

RAMs (Low power) for ATPL, WATFORD, etc.,  
Sideways ROM Boards

**6264LP (8K) £3.00**

**2 x 6264LP (16K) £5.90**

## KAGA KP810 NLQ PRINTER

This rugged printer is made by Canon of Japan and is the same as Canon PW1080. It is fully Epson FX80 compatible and offers superb NLQ printing.

Our Price: **ONLY £215** (£7 carr.)

Kaga RS232 Interface	<b>£49</b>
Kaga RS232 Interface + 2K Buffer	<b>£69</b>
Kaga RS232 Interface + 16K Buffer	<b>£95</b>

## KAGA KP910 Printer

Similar to the KP810 but has 17" wide carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

**ONLY £339** (£7 carr.)

## PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	<b>£6</b>
Extra long (6 feet long)	<b>£8</b>
RS232 Cable	<b>P.O.A.</b>
IBM Parallel 1 meter Cable	<b>£12</b>

## HITACHI 672 PLOTTER

**Only: £450** (Carr £6)

## PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	—	<b>£3.50</b>
BBC Master	—	<b>£4.00</b>
FX100	<b>£7.00</b>	<b>£5.25</b>
FX80/MX80/FX85	<b>£4.50</b>	<b>£4.95</b>
LX80	<b>£4.50</b>	<b>£4.50</b>
LX80	<b>£4.00</b>	<b>£4.50</b>
GP80	<b>£4.50</b>	<b>£4.00</b>
GP100/GP250	<b>£5.95</b>	<b>£3.95</b>
Centronics GLP	<b>£4.00</b>	<b>£3.75</b>
KAGA KP810	<b>£5.25</b>	<b>£4.75</b>
CANON PW1080	<b>£5.25</b>	<b>£4.75</b>
Panasonic KX1080	<b>£7.75</b>	<b>£4.75</b>
Microvitec Metal Monitors	—	<b>£5.50</b>

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## Listing Paper (Perforated)

1,000 Sheets 9½" x 11" Fanfold Paper	<b>£7</b>
2,000 Sheets 9½" x 11" Fanfold Paper	<b>£12</b>
1,000 Sheets 15" x 11" Fanfold Paper	<b>£9</b>
Teleprinter Roll (Econo paper)	<b>£4</b>

Carriage on 1,000 Sheets £1.50

## PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90x36mm (Single Row)	<b>£5.00</b>
1,000 90 x 36mm (Twin Row)	<b>£4.90</b>
1,000 90x49mm (Twin Row)	<b>£7.50</b>
1,000 102x36mm (Twin Row)	<b>£6.25</b>

Carriage on 1,000 Labels £1.00

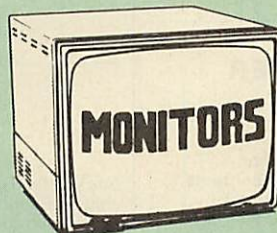
## Acorn/Olivetti JP101

### Spark Jet Printer

Special Clearance Offer **£65**

Pack of 4 refills **£9**

### JP101 Sparkjet Dump Rom £15



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

### MICROVITEC 14"

- 1431 - Medium resolution as used on the BBC television computer programme ..... **£172**
- 1451 - High resolution, suitable for word processing in mode 0 ..... **£225**
- 1441 - High res, exceeds the capabilities of the BBC micro ..... **£365**
- 1431AP RGB + PAL and AUDIO ..... **£199**
- 1451AP RGB + PAL and AUDIO ..... **£259**
- TOUCHTEC Touch Screen Pack ..... **£250**
- Dust Cover for Microvitecs ..... **£5.50**

### KAGA/TAXAN 12"

- KAGA KX1201G Hi-res Green Monitor ..... **90**
- KAGA KX1202G Long persistence Hi-Res Green Monitor ..... **£98**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor ..... **£98**
- KAGA Super Vision 3, Ultra Hi-res, RGB Colour; Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue ..... **£320**
- PHILIPS 12" Hi-Res Amber Monitor ..... **£69**

### FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen. **£169**

### ZENITH

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith Micro Systems.)  
Green (New Design) Hi-res ..... **£69**  
Amber (New Design) Hi-res ..... **£76**

### LEADS

- BNC Lead for Zenith or Philips ..... **£3**
- RGB lead for KAGA ..... **£3**
- N.B. Carriage on Monitors **£7** (securicor)

## SWIVEL BASES

for Video Monitors

Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

for 12" Monitors **£12** (carr. £2.50)  
for 14" Monitors **£16** (carr. £2.50)

## BBC MICRO BUSINESS/ WORD-PROCESSING PACKAGE

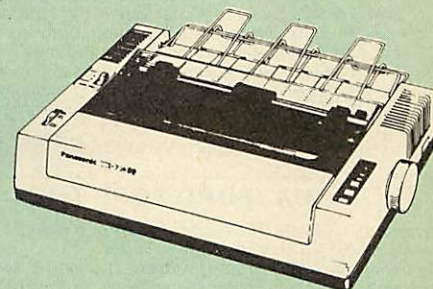
A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

### EXAMPLE PACKAGE

BBC Master 128K Micro, View wordprocessor, Viewsheets, Basic Editor, Terminal Emulator, Twin 800K 40/80 track double sided Disc Drives, Zenith Hi-Res green monitor, Brother HR15XL professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

**Only £949**

## Panasonic KX-P1080



From the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer

Available NOW at a superbly realistic price, the KX-P1080 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 100 cps of clear Draft text backs up the crisp 20 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even-left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 x 9 matrix, with Near Letter Quality effected by means of an 18 x 18 matrix.

As an extra special bonus to all Watford customers purchasing the KX-P1080 NLQ Printer, we are currently providing not only 1,000 sheets of fanfold paper completely FREE of charge but also a printer lead to connect the marvellous KX-P1080 to a BBC Micro, absolutely FREE. These gifts alone are worth £15.

Introductory Price: **£155** (carr. £7)

(FREE with every KX-P1080 printer purchased this month, 1000 sheets of Fanfold Paper, a Printer Cable and the popular Dump Out 3 ROM worth £43)

**Continued** →



## MARK 2 LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor. The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen £17

## THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at £5.95 (No VAT)

## WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.

In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

## WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

### PRICES

- Complete Disc Interface Kit incl. DFS ROM & fitting instructions £54
- Acorn's 0.90 DFS Kit complete £52
- DFS Manual (Comprehensive) (no VAT) £6.95
- (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- Watford's sophisticated DFS ROM only £16
- We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only £12
- DNFS ROM only £17 ● ADFS ROM only £25
- Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.

## WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD & 7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

### PRICES

- Complete DDFS Kit incl. fitting instructions £46
- DDFS Manual (no VAT) £6.95
- We will exchange your existing Single Density DFS Kit for our DDFS Unit at £35

## Watford Electronics DDFS PLUS for the BBC B Plus

The Watford DDFS Plus, written specifically for the BBC B Plus Microcomputer, replaces the 1770 DFS from Acorn. It not only provides BOTH, single and double density operations in DFS mode, but the DDFS Plus also permits the use of an extended catalogue, giving 62 files per catalogue. It also incorporates all those excellent features of the popular Watford DFSs, and more.

N.B. SRAM and Tube functions not duplicated.

DDFS PLUS (for BBC Plus) £30  
(Price includes comprehensive manual)

## MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

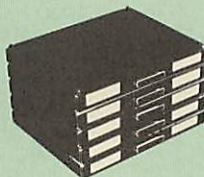
Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES OF DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

## DISC ALBUMS £4

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

## STAK-PAK



The unique computer program filing and storage system. Made of tough black plastic, these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two C12 Data Cassettes with labels plus external index card.

Five twin Packs incl.  
10 Cassettes Only: £5

## FLOPPY HEAD CLEANER KIT

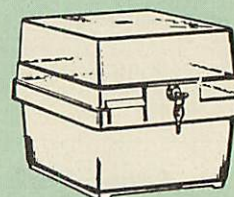
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

## LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

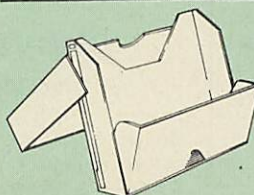
M35 – holds upto 50 discs £8  
M85 – holds upto 95 discs £11



## PLASTIC LIBRARY CASES

FOR 5 1/4" DISC STORAGE  
holds 10 Discs.

£2.00



## DUST COVERS (For our Disc Drives)

Single CLS (without PSU) £3.20 Twin CLD (without PSU) £3.85  
Single CS (with PSU) £3.95 Twin CD (with PSU) £3.90



## Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). Both are of Japanese manufacture.

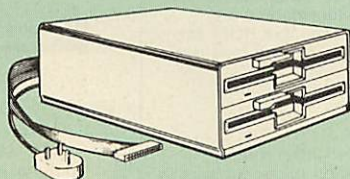
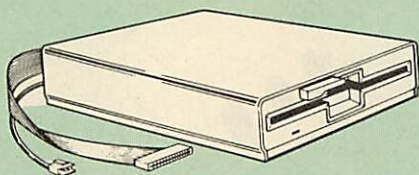
**All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate; extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. We are now able to supply all single disc drives in Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives; allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today!)

When using a BBC Micro, most people find themselves short of space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space; your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £99	
400K (720K)	CLS400S £97	CLD 400 £165	CS 400S £110	CD400 £189
800K (1.44M)		CLD 800S £183		CD 800S £205
● TWIN Disc Drive Case, complete with Power Supply & Cables <b>£35</b> Securicor carriage on Disc Drives £6				

Prefix C = Cased Drive  
L = Less PSU  
S = Single  
D = Double

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

Suffix S = 40/80 Switchable

## 3M - DISKETTES

Top quality 3M - SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- 10 x 5 1/4" S/S D/D 40 Track Diskettes **£10**
- 10 x 5 1/4" D/S D/D 40 Track Diskettes **£12**
- 10 x 5 1/4" S/S D/D 80 Track Diskettes **£17**
- 10 x 5 1/4" D/S D/D 80 Track Diskettes **£17**
- Hi-Density 1.6M D/S D/D for IBM **£32**
- 10 x 3 1/2" S/S D/D 40/80 track Discs **£20**
- 10 x 3 1/2" D/D D/D 40/80 track Discs **£27**

**3 1/2"**

(FREE with every pack of 10 3M Discs, a handy Durabeam Torch) While stocks last.

## TOP QUALITY 5 1/4" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

### DON'T SETTLE FOR LESS, BUY THE BEST

- 10 x M4 S-S D/D 40 Track Discs **£9**
- 10 x M5 D/S D/D 40 Track Discs **£11**
- 10 x M7 D/S D/D 80 Track Discs **£15**
- 3" Double Sided Discs **£4 each**

## Special BULK OFFER on 5 1/4" DISCS

(Supplied packed in plastic storage Units)  
(Lifetime warranty on Discs)

Type	Description	Pack of 20	Pack of 50
M4	Single/Side Double/Density 48TPI	<b>£16</b>	<b>£40</b>
M5	Double/Side Double/Density 48TPI	<b>£20</b>	<b>£52</b>
M7	Double/Side Double/Density 96TPI	<b>£27</b>	<b>£65</b>

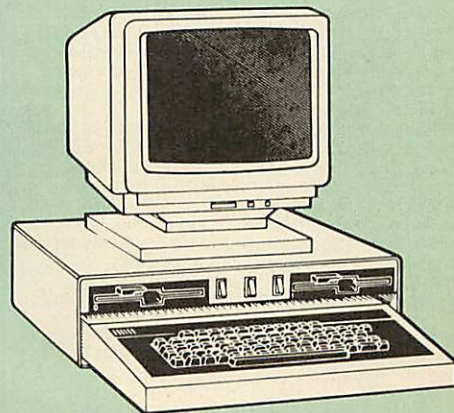
## DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**  
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

## ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.  
10 Megabytes **£1050**; 30 Megabytes **£1549**

## CDP 800S CDPM 800S



Twin 800K Double sided 40/80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

**CDP 800S for BBC Micro £235**

**CDPM 800S for Master £245**  
(Securicor Carr. £7)



## EPSON NLQ ROM for the BBC Micro



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type \*NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used separately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

**Only: £25**

## VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM. A must for all VIEW and NLQ ROM users.

**£7.00**

(Hi-View compatible)

## THE NLQ DESIGNER

(The First & still the Best)

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

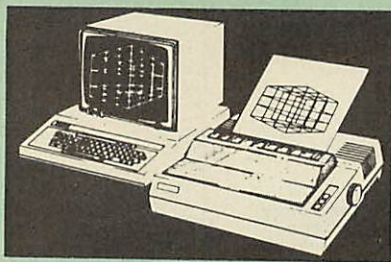
A 40 or 80 track (please specify) FONT Disc containing 10 Fonts, (Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print, Gothic and Greek is now supplied FREE with every package.

(P.S. This ROM is not suitable for Epson printer

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

## DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate - if anyone can supply flashing ink we would like to know!

The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.

Two commands are used to operate the dump routines:

\*GIMAGE - This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

*Practical Electronics, May 1985*

"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro ..."

"an extremely sophisticated and powerful dump utility".

"VERDICT - Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

*The Micro User Feb. 1985.*

"Well, here is that winner!"

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of \*GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopy or trick photography".

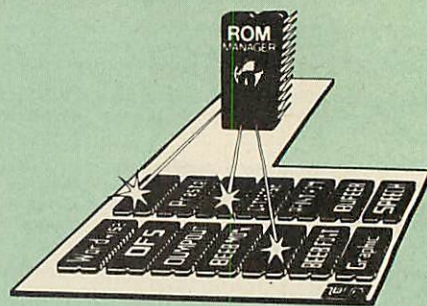
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc. Price including comprehensive manual

**£25**

## ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

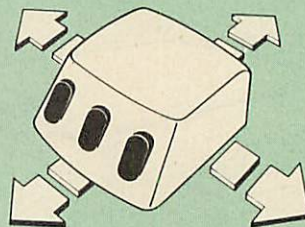
Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any \* command to any specific installed ROM. It is said that imitation is the sincerest form of flattery - Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

**SPECIAL OFFER £18**

## THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

**ONLY: £65** (carr £1.50)

FREE With every AMX Mouse package purchased from us, we are giving away, absolutely FREE, our popular Colour Art software package worth £15.

AMX DESK Package	<b>£19.00</b>
AMX UTILITY Package	<b>£11.00</b>
AMX SUPERART Package	<b>£42</b>
AMX PAGE-MAKER Pack	<b>£42</b>
AMX 3D ZICON Disc	<b>£20</b>
AMX Database Disc	<b>£20</b>
AMX XAM Educational	<b>£20</b>

## RB2 MARCONI TRACKER BALL

This popular unit is supplied complete with software.

Price: **£50**

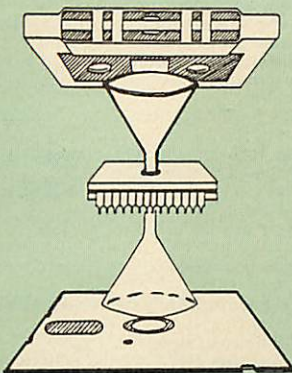
## FLEET STREET EDITOR

Software pack **£35**



## TRANSFEROM

(Tape to Disc Utility)



Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

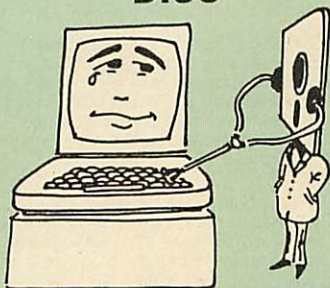
- Fully menu driven for ease of use
- Copies with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSS. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required - Single or Double Density.

**£25.00**

## DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## ROMAS

### THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referencer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

#### The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at... **Only £45**

Please specify 40 or 80 track disc when ordering.

## ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time..."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

"... that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

"... ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

"... and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, ... I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

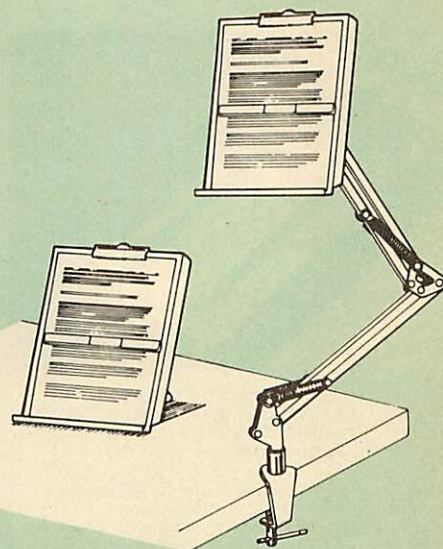
Compatible with: View, Wordwise & Wordwise

Don't settle for less. Buy the best.

**£25**

(Not compatible with 1770 DFS)  
(Please state 40 or 80 track disc)

## COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only  
Desk Top **£10** (carr. £2)  
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£13** (40 or 80 track)

## BEEBMON

The most powerful machine code monitor for the BBC Micro **£24**.

## DISASSEMBLER ROM

**ONLY £16**

## THE INVESTIGATOR

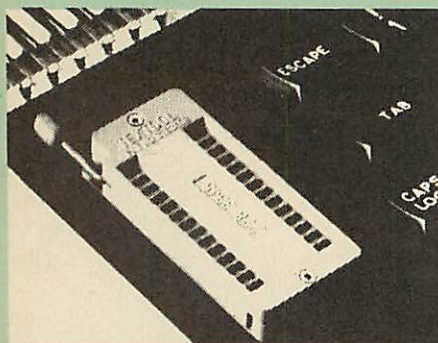
This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSS) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

**Only £20**

**Continued** →



## SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.  
**ONLY £15 (carr £2)**

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

Complete System ..... **£12**  
Spare Cartridges ..... **£2.50**  
Spare Rack ..... **£1.50**

## 16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

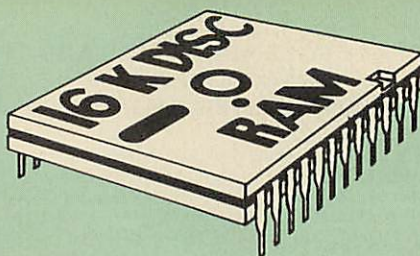
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29 (carr £2)**

### Optional extras

READ and WRITE protect Switches **£2 each**  
Battery for Battery Backup **£3**



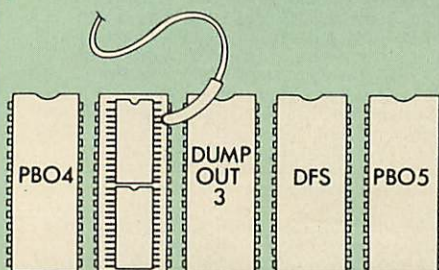
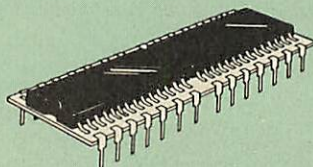
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

**New Low Price: £30 (carr £2)**

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. **Compatible with BBC B Plus.** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28 (carr 2)**

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

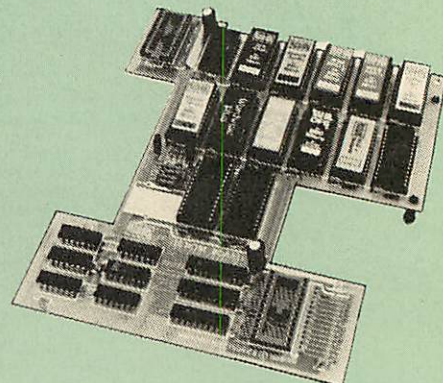
Do you require:

- Sideways RAM for a BBC B? Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc? Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:

- 1) 16k Sideways RAM Module
- 2) 16k Disc RAM
- 3) Solid State 16k Sideways RAM

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others - not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissible, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

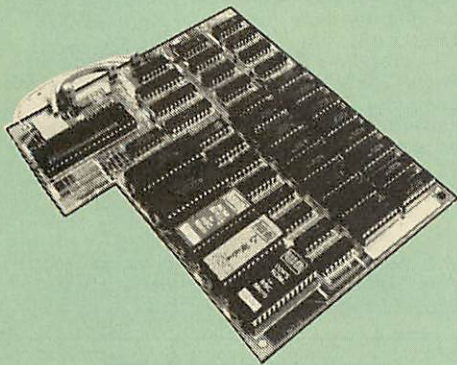
**Price: Only £32**

Battery backup fitted **£36**  
(carriage £2)



## Watford ROM/RAM CARD

*A must for all serious users*



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD & 7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

### INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM **£43**
  - ROM/RAM card with 64k dynamic RAM **£59**
  - ROM/RAM card with a massive 128k dynamic RAM **£89**
- (carriage on ROM/RAM Card £3)

### OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£6**
- Battery backup **£3**
- Read and Write protect switches **£2 each**
- Complete ROM/RAM board (all options installed) **£99**
- 16k Dynamic RAM for Upgrade **£7.50**

## Le Modem



### The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- A complete communications terminal that transforms your BBC Micro into a very powerful Worldwide data transfer system.
- Auto Dials, Auto Answers, and is completely controlled by your Micro. There are no external controls!
- Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.
- Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.
- Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.
- A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!
- FULLY controlled by simple \*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!
- Connects to the 1MHz bus. A \*AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.
- Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A \*TEST facility gives ON SCREEN indication that Le MODEM is working correctly.
- Packaged in such a way that you need nothing else except a BBC Micro to communicate with computers all over the world.
- FREE 3 months subscription to MicroLink.

- BT Approval applied for.

Price: **£89**  
(carr £3)

PROHIBITED from direct or indirect connection to any telecommunications system run by British Telecommunications. Action may be taken against anyone so connected who breaches this prohibition.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)  
(Write in for further details)

## Nightingale Modem

SPECIAL PRICE to our Customers

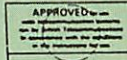
**£99**

(carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

- Nightingale Modem without software **Only £87**
- COMMSTAR ROM package only **£29**  
(P&P on modem £2.00)
- Auto Dial/Auto Answer Board (non BABT) ..... **£48**
- Auto Dial Utilities Disc **£9.50**
- OBBS Bulletin Software **£20.00**

## APOLLO



### The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost - High Performance modem with Auto Dial & Auto Answer facilities as standard; we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200/1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution - Buy a Watford APOLLO!

Special Launch Price: **£75 (Carr £3)**

(Write in for full specification)

## Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

**£42 (carr. £4)**

### BT TELEPHONE CONNECTORS

LJU 1/4A Mini Line Master	£4.50
LJU 1/6A Mini Line Slave	£3.00
LJU 2/4A Line Master	£4.00
LJU 2/6A Line Slave	£2.50
LJU 3/4A Flush Master	£3.95
LJU 3/6A Flush Slave	£2.75
LJU 10/3A Dual Splitter	£5.50
4 Way BT Plug	£0.75

### Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE **£32 (carr £2)**

Continued



## COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£27
Graphics ROM	£23
Disc Doctor ROM	£24
TERMI	£27
COMMUNICATOR	£49
SPEECH ROM	£26
Printmaster	£24

## Wordwise £25

## Wordwise plus

£40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

## Word-Aid

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

### HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

## Inter SHEET £40

## INTER-CHART ONLY: £26

## Inter-WORD

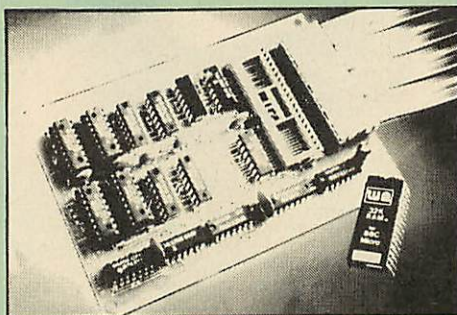
Only: £46

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

Only: £39

All Prices Exclusive of VAT

## 32K SHADOW RAM- Printer Buffer Expansion Board



### A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B+ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

● Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (\*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!

● Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful \*HELP messages, and a comprehensive manual is supplied free.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

## INCREDIBLE WORD PROCESSING DEAL !!!

*Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!*

*A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:*

Only £75 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

## VIEW

VIEW WORDPROCESSOR 2.1 ..... £37

## VIEW 3.0 ROM

Price: Only £56

## HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£36

VIEW SHEET (Acornsoft) £37

VIEWSTORE £37

VIEWSPELL £29

VIEWPLOT Disc £22

VIEW-INDEX £14

### Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

### VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

### VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED (Officially approved by Silver Reed)

Only: £10

### SPECIAL OFFER Acorn's Speech Synthesiser Package

Complete with manual in its original packaging

Clearance price Only: £19





## ARIES CORNER

Aries Computers was the first company to commercially market what is now known as SHADOW RAM. As part of its continued expansion policy, Watford Electronics is proud to announce that the Aries range is now available exclusively from Watford Electronics and their dealers.

The Aries range, designed by experts offers you the solution to your upgrade nightmares. All the Aries products are compatible with double density disc controllers, modems, second processors, ECONET, hard discs, EPROM programmers and of course, other members of the Aries family and most of the much wider Watford family (some products advertised here perform identical functions and hence cannot be used together). Several major companies now test all their products to ensure compatibility with the Aries B20 & B32.

In quality of construction, the Aries range sits alongside the Watford range in setting a standard against which others are judged. Custom made connectors eliminate the damage to the BBC machine caused by inferior products.

### The Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved \*FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro - no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

### Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve

sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:  
Aries B-12 **£40**. Aries B-12C **£5**

### THE ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

### THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 - BBC B, MOS 1.20, hardware plugs into CPU socket.

Aries B-12 - BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.

Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.



**CREDIT CARD 24 HOUR**  
**Ansaphone Hot Lines**  
**(0923) 50234/33383**



### النور ARABIC ROM for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

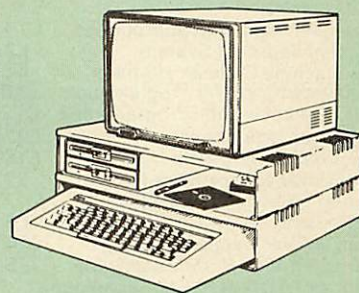
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

**£85**

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

### PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH ..... **£11** (carr. £1.50)  
DOUBLE BBC PLINTH ..... **£20** (carr. £2.00)  
PRINTER PLINTH ..... **£10** (carr. £1.50)  
SINGLE MASTER PLINTH ..... **£14** (carr. £1.50)  
DOUBLE MASTER PLINTH ..... **£25** (carr. £2.00)

### OFFICE MATE

The popular Database, Spreadsheet, Beebplot and Wordprocessor on Disc  
**£10**

### OFFICE MASTER

The popular Cashbook, Final Accounts, Mailist, Easiledger, INvoice & Statements and Stock Control  
**£21**

### Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

### L.B.O. Rom

#### Life & Business Organiser

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

### DDD Suite Integrated Software System

-BASE **£12**  
-CALC **£12**  
-PLOT **£12**

COMBO PACK All 3 together **£26**

Continued

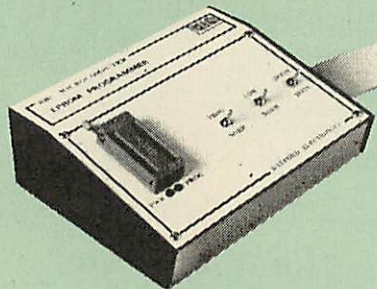


## BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development System	£7.50
6502 Machine Code for Humans	£7.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£12.95
68000 Programming the	£22.95
6809, Programming the	£16.95
A User Guide to Wordwise Plus	£9.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£14.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for BBC	£6.95
<b>Advanced User Guide for BBC</b>	£13.50
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£9.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic Programming on the BBC Micro	£6.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Machine Code Portfolio	£7.95
BBC Master 128 High Flyer	£10.95
BBC Micro Advanced Ref. Guide	£10.95
BBC Micro Advanced Programming	£9.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro ROM Book	£9.95
BBC Micro Disc Companion	£8.95
BBC User Guide	£10.00
BCPL User Guide	£14
Complete FORTH	£6.95
CP/M - 86 User's Guide	£19.95
CP/M Bible	£16.50
CP/M Handbook with MPM	£9.95
CP/M Plus Handbook	£13.95
CP/M Soul of	£16.50
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
<b>DISC FILING SYSTEM (DFS)</b>	
<b>Operating Manual for BBC</b>	£6.95
Disc Programming Techniques	£9.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Games BBC Micro Play	£6.95
Graphs & Charts on BBC Micro	£7.50
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing & Robotics on BBC	£15.95
Interfacing Your BBC Micro	£8.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing CP/M on the BBC Micro	£28.00
2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO - PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
LISP the Language of Artificial Intelligence	£9.95
Logo Programming	£9.95
<b>Mysteries of DISC DRIVES and DFS REVEALED</b>	£5.95

Mastering CP/M	£17.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.95
Master Reference Manual Part 2	£14.95
Micronet Handbook	£6.95
Programming the 6502	£16.95
Programming the Z80	£19.95
Sensing & Control Projects for BBC	£5.95
S-PASCAL on BBC Micro	£7.50
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
Terminator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
<b>The Epson FX/KAGA PRINTER</b>	
<b>Commands REVEALED</b>	£5.95
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View 3.0 User Guide	£10
View Guide	£4.50
Viewsheet User Guide	£10
Viewstore User Guide	£10
Using BBC Basic	£4.95
Wordprocessing BBC Beginners Guide	£7.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z80 Applications	£15.95
Z80 Assembly Language Programming	£19.95
Z80 Reference Guide	£9.95

## EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed - wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

### SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and integrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

### Software facilities include:

Load File - Save File - Down Load EPROM - Program EPROM - Verify - Blank Check - Editing of memory contents prior to programming. Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the \*ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

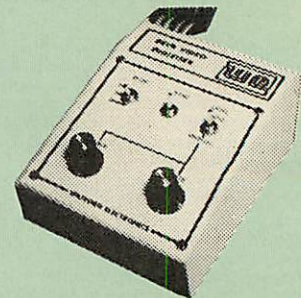
**SPECIAL OFFER £69 (£3 carr.)**

## TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** - Standard version erases up to 16 chips. **£28 (carr £2)**
- **ERASER GT** - Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30 (carr £2)**
- Spare UV tubes. **£9**

## BEEB VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional \* commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£110 (Carr. £3)**

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)  
(BBC B+ and Master compatible, except Master with Econet)

## Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters - in fact anything that needs to be created on A4 size paper. With Pagemaker's many features, a variety of pictures can be composed - the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects. Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out. The Magazine Maker is suitable for any use that requires illustrated documents.

**Complete Package £129.00 (carr. £3)**



## VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£16
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc/Tape	£7

## ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: £2

## SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only £7.50

## ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price £13 (£2 carr.)

28 pin ZIF SOCKET (Textool) £6.95

28pin DIL HEADER PLUG  
SOLDER type £1.50  
IDC CRIMP type £1.95

## SPARES for BBC Micro

Keyboard	£46	Keystrip	£2
UHF Modulator	£4	Case	£25
Speaker Grill	£1	Speaker	£2
Power Supply	59	Keyswitch	£1.50

## Replacement FLEXIBLE KEYBOARD CONNECTOR £3

8way DIP SWITCH £0.85

## CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug to 5 pin DIN Plug + 1 Jack Plug	£2.00
to 3 pin DIN Plug + 1 Jack Plug	£2.00
to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50

## DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.  
Single £3.00 Dual £3.75

## DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable  
Single £4 Twin £6

## MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	80p	200p
BBC Power Plug 6 way	80p	—
Disc Drive Plug 4 way	75p	—
BBC Power Socket 6 way	95p	95p

# Watford Electronics' Dealer's List

## UNITED KINGDOM

AKHTER INSTRUMENTS LTD  
Akhter House, Perry Road, HARLOW Essex.

Beebug Retail, Polphin Place, Holywell Hill, St. Albans.

Cirkit Distribution Ltd.  
Park Lane, Broxbourne, Herts.

Dennis Spitz Computers Inc.  
86 Golders Green Road, London NW11.

DMS, 2 Budgies Close, Taunton, Somerset.

Greenbank Electronics.  
92 New Chester Road, New Ferry, Wirral, Merseyside.

Gemini Marking Ltd.  
Exmouth, Devon.

Microman Computers.  
Rainford Industrial Estate, Mill Lane, Rainford, St. Helens.

Twiststar Computers Ltd.  
Apex House, Blandford Road, Norwood Green, Southall.

Verospeed Ltd.  
Boyatt Wood, Eastleigh, Hants.

## OVERSEAS DEALERS

Absolute Electronics.  
483 Centre Road, Bentleigh, Victoria, Australia 3204.

Alpha Computer Co.  
Shop 314 Chi Fu Commercial Centre, Chi Fu Fa Yuen, Hong Kong. Tel: 5-506592.

ECD BV, Voldersgracht 26, 2611 EV Delft, Holland.

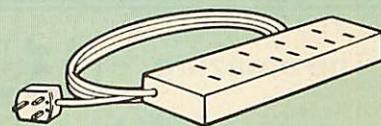
SCIENTEX P.V.B.S.  
Zilvermidstratt 2, B-2000 ANTWERPEN Belgium. Tel: 03 233 59 06.

TECHNO-MATIC DATA  
Holdergsgade 19, 1057 KOBENHAVN K, Denmark.

Velobyte, Schiedamzedijk 5a-6a, 3011 EB. Tel: (010) 413 8197/414 5171.

Viking Tecno, Vestergade 12.1, 9620 Aalestrup, Denmark. Tel: 08 642522.

## 4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug. £9.50 (carr £1.50)

## ACORN MUSIC 500

BBC B, B+ & Master Compatible

(We have inspected a Music 5000 unit and to our surprise we found it to be the same as Music 500 unit. Only the front panel and the software are different. Can anyone help us to solve the mystery?)

£72 (carr £4)

Software Disc 'Mu-500' has 13 tunes **Only: £6**

## CHIP SHOP

8271	£36	BCPL Calc Pack	£15
DS3691	£3.50	BCPL Stand Alone	
DS88LS120	£5.25	Generator	£36
LM324	£0.45	Basic Editor	£25
SN76489	£5.50	BROM	£28
SA45050	£8.75	Buffer & Backup	£20
UPD7002	£4.40	Beebmon	£22
2764-250nS	£2.00	Beebfont	£25
27128-250nS	£2.50	Acorn COMAL	£36
27512	£18	Acorn FORTH	£32
4013	60p	Acorn Graphics	£25
4020	£0.90	Graphics Extension Rom	
4464	£8	GXR-B	£21
4816 RAM	£1.75	GXR-B+	£22
6264LP-8K		Acorn LISP	£35
RAM	£3.00	Acorn LOGO	£42
6502A CPU	£5	ISO Pascal	£42
65C02 CMOS	£10.00	ISO-Pascal Stand	
65C12	£9	Alone Generator	£30
6512A	£10.00	ICON Master	£28
6522	£3.40	Logotron LOGO	£52
6522A	£5.00	Micro Prolog	£62
6845SP	£6.00	Microtext ROM	£48
7438	40p	ROMIT	£29
74LS00	25p	Serial ULA	£13
74LS04	25p	Video ULA	£15
74LS10	25p	TERMULATOR	£25
74LS123	80p	MUROM	£21
74LS163	70p	SLEUTH ROM	£24
74LS244	80p	STUDIO 8 Disc	£18
74LS245	£1.00	Toolkit Plus	£31
74LS373	£1.00	Communicator	£49
74LS393	£1.00	Disassembler	£16
75453	70p	Help II	£27
		Mini Office II	£14.50
		View 2.1	£37
		View 3.0	£56
		Hi-View	£36
		Viewsheet	£37
		Viewstore	£37
		Viewspell	£50
		Viewplot Disc	£25
		Datagem (Gemini)	£34

## ASSORTED ROMS

ACORN BASIC2	£19
ACORN ADFS	£25
ACORN DNFS	£17
Acorn OS 1.2	£6
Acorn OS B+	£25
Acorn BCPL	£42

Prices subject to change without notice and available on request. ALL OFFERS subject to availability.

Mail Order and RETAIL SHOP. Trade and Export inquiries welcome. Government and Educational Establishments' OFFICIAL ORDERS Accepted.

Shop Hours: 9.00am to 6.00pm. Monday to Saturday. Thursdays 9am to 8pm. (Free Customer's Car Park)

VAT: UK customers please add 15% VAT to cost incl. Carriage.

CARRIAGE: Unless stated otherwise, minimum £1 on all orders. £2 on Larger items. On bulkier items, £7 Securicor charge applies. Overseas orders, carriage is charged at cost.

Specifications of all products are given in good faith but is subject to change without notice. Some items vary in their availability. Please ring for latest delivery situation.

# Watford Electronics

JESSA HOUSE, 250, Lower High Street, WATFORD, ENGLAND  
Telephone: (0923) 37774; Telex: 8956095 WATFRD



# ICE-BOX

The amazing **NEW** utility for  
sideways RAM

## LOOK AT THE FACILITIES

- Transfers 98% of all tape software to disc (inc. specially formatted tapes that other systems cannot handle).
- "Save game" to disc at any point irrespective of filing system selected.
- Freeze frame, slow motion (9 speeds), single step (5ms at a time) at any point in a program.
- Swap between any number of concurrent activities each with their own screen or screen window.
- Change OS functions while a program is running (e.g. sound on/off).
- Allows screen dumps to be made without affecting the current program.
- Works with all disc filing systems, both single and double density.
- Comprehensive 32 page manual.
- Simple "menu" operation plus "star" commands.

Requires:  
BBC/B with OS 1.20  
disc drive and  
16K sideways ram

**PRICE £18**  
(inc. VAT, P&P)

Supplied on disc in 40/80 track compatible format

Send orders to:

**EVENT ONE LIMITED, 89a Newtown Road, Malvern, Worcs.  
WR14 1PD. Tel: (06845) 65671.**

# MICRO-TRADER

## INTEGRATED SALES PURCHASE AND NOMINAL LEDGERS

Designed for business use by a business man programmer. MICRO-TRADER is a fully integrated program in which all **Sales and Purchase Ledger** transactions are automatically updated to the **Nominal Ledger**.

MICRO-TRADER offers full Sales and Purchase ledger facilities including **SALES INVOICE** and **STATEMENT PRINTING** with a capacity of **450 accounts** and **3000 transactions per month** in each Ledger.

**Normal Income Expenditure, Assets, Liabilities & Journal Posting** in the **Nominal Ledger** with full **Reporting** for individual accounts, **Audit Trail**, **Trial Balance**, **Profit & Loss** and **Balance Sheet**.

This suite is the only accounts package a real business needs to keep, maintain and finalise its accounts. If you are seriously in business consider how much time and money you spend and lose because you are not an accountant. You are a businessman and so am I. You have a computer and so have I, all you need is MICRO-TRADER to let you get on with running your business. I have already got it.

MICRO-STOCK would be an asset if you purchase goods in your business. It is a **Stock Control** program, fully integrated with MICRO-TRADER. **4000 Stock Items** with **user defined codes**. **Invoice and Credit Notes** and **Cash Sale routine**. **Full Stock Held Reports**.

If you have staff let **EXTENDED PAYROLL** solve the wages problem. We have been supplying payroll programs for a year longer than anybody else for the BBC and people trust us.

**MICRO-TRADER £200 - MICRO-STOCK £95.00 - EXTENDED PAYROLL £49.95 (+ VAT)**

**Micro-Aid**

(AU),  
25 Fore Street, Praze, Camborne,  
Cornwall TR14 0JX  
or Telephone 0209-831274 with ACCESS  
or PRESTEL \*2582020



## ALL PRICES INCLUDE VAT

### DISC DRIVES

DUAL DRIVES 80/40 TRACK  
CD800/S 2x400K INC PSU 320.95  
CDX800/S 2x400K LESS  
PSU 265.95  
MS202D 2x100K INC PSU (40T) 274.95  
AND MONITOR STAND  
MD802D 2x400K INC PSU  
AND MONITOR STAND 344.99

SINGLE DRIVES 80/40 TRACK  
CS100 100K INC PSU (40T) 130.95  
CSX100 100K LESS PSU (40T) 99.95  
CS400/S 400K INC PSU 160.00  
CSX400/S 400K LESS PSU 140.00

### HARDWARE ADDONS

EPROM PROGRAMMER 79.40  
ROMIRAM CARD WITH  
32K RAM 51.75  
SHADOW RAM/PRINTER  
BUFFER 32K 67.85  
SIDEWAYS RAM MODULE  
16K 33.35  
SIDEWAYS ROM BOARD  
(SOLDERLESS) 36.80  
SOLID STATE 16K RAM  
MODULE 32.20  
VIDEO DIGITISER 113.85

### MOUSE

MOUSE + SUPER ART  
SOFTWARE 89.00  
SUPER ART SOFTWARE 49.95  
PAGEMAKER 49.95  
3D ZICON 24.95  
DESK 24.95  
XAM 24.00  
UTILITIES 14.95  
COLOUR ART FOR AMX  
MOUSE 11.50

ROMS FROM  
COMPUTER  
CONCEPTS  
BEEBUGSOFT  
ACORN  
& WATFORD

INCLUDING:-  
WORDWISE 29.95  
WORDWISE+ 46.20  
TOOLKIT+ 39.00  
VIEW 2.1 59.80  
VIEW 3.0 89.70

### DFS KITS

DFS KIT 0.90 (SINGLE  
DENSITY) 54.05  
DFS KIT (SINGLE DENSITY) 65.55  
DFS KIT (DOUBLE DENSITY) 55.20  
DNFS ROM 25.00  
WATFORDS OWN DFS  
MANUAL 6.95



**APPOINTED  
WATFORD  
DEALER**

WE ARE STOCKING ALL  
WATFORDS PRODUCTS  
INCLUDING ROMS,  
HARDWARE & SOFTWARE

### MODEM OFFER

MAGIC MODEM  
AUTO ANSWER  
BT APPROVED INC  
SOFTWARE (ROM)  
£110.00

MODEM ALONE £89.95  
SOFTWARE (ROM) £39.95

PLEASE ADD CARRIAGE  
£5.50 FOR PRINTERS & DRIVES  
£1.50 FOR OTHER ITEMS

PLEASE SEND SAE  
FOR PRICE LIST

## EXPRESS SPECTRUM, BBC and COMMODORE REPAIRS!

SPECTRUM REPAIRS  
BETWEEN £19 and £120

BBC REPAIRS  
BETWEEN £14 and £45

COMMODORE  
REPAIRS BETWEEN  
£14 and £35

### WHY PAY HIGH 'FIXED' PRICES

(We do not charge you for our  
fancy premises by charging  
high 'fixed' prices!)

Reputations take time to build,  
we have been repairing ZX 81's,  
Spectrums, QL's, Apples and  
BBC's professionally, for 2½  
years - who is coming second?

in all U.K. with While-u-Wait repairs!  
with INTERNATIONAL repair service!

FOR PROFESSIONALISM - "Of all the  
repair companies 'Sinclair User' spoke  
to, **MANCOMP** seemed the MOST  
PROFESSIONAL when it came to advice  
and a helpful attitude" AUG 85.

FOR HONESTY - We let you watch  
your computer being repaired and if  
there is nothing wrong with it, we will  
tell you!!!

FOR REPUTATION & HELPFULNESS -  
"I have come across a firm that will be  
more than willing to advise you as to  
how to remedy your problems. They  
are called **MANCOMP** and as well as  
repairing faulty computers, are also  
quite willing to discuss your problems  
with you and offer reasonably cheap  
and more importantly CORRECT  
CURES" Phil Rogers POPULAR  
COMPUTING WEEKLY JAN 85.

Every parcel sent by  
Royal Mail Receipted Post and insured  
for return journey!  
(For next day delivery include £1.50  
extra).

(Securicor by prior arrangement).  
On-site maintenance for Apples,  
I.B.M.'s and most makes of printers  
also available.

**Guaranteed 4hr response!**

**WHY DELAY - OUR ESTIMATES ARE  
FREE AND WITHOUT OBLIGATION. IF  
YOU DO NOT LIKE OUR ESTIMATE  
WE WILL RETURN THE COMPUTER  
AND REFUND THE POSTAGE  
INCURRED!**

**EXTRA-SPECIAL DISCOUNTS FOR  
EDUC INST., H.M. FORCES,  
CHARITIES, HOSPITALS, ETC!**

Hardware and software design  
problems? Contact us for the  
complete service, from design  
through to manufacture.



**MANCOMP LTD**  
(Dept. AU10)

Printworks Lane, Levenshulme,  
Manchester M19 3JP

Phone 061-224 1888.

OR 061-224 9888.

Terms and conditions available on request.

What we do today...  
others do tomorrow!





# HARDWARE

**AMB15 BBC MASTER 128** £395.00

- \* 128K
- \* Complete with View, Viewsheets, A Basic editor, Termulator, ADFS, 1770 DFS and Basic
- \* Battery backed up RAM
- \* Two ROM Cartridge Sockets
- \* Numeric keypad

**MASTER COMPACT** P.O.A.

- \* 128K Computer
- \* 640k Disc Drive Built Into a Monitor Bridge
- \* Available With Mono or Colour Monitor
- \* RGB, Comp Video, Joystick and Printer Port
- \* Includes Sprite Rom, View, Filing System etc

**ANB55 BBC B+ 128K** £325.00

- \* 64K BBC Basic
- \* Sideways RAM
- \* 1770 DFS

**ANB03 BBC B INC DFS** £299.00

- \* 32K Computer
- \* Includes Acorn DFS

**ADC08 512K UPGRADE** £329.00

- \* IBM Compatible
- \* Concurrent DOS
- \* 80186 Processor
- \* Use with disc drives or Winchester

**ADB06 TURBO UPGRADE FOR MASTER** £102.00

- \* 65C102 second processor
- \* 4MHz
- \* 64K RAM extra
- \* Hi-basic
- \* Hi-Editor
- \* Printer buffer software

**PTC5000 MUSIC 5000** £140.00

- \* Compatible with BBC B, B+ and Master
- \* Complete with ample on ROM
- \* Multi user-friendly input modes for ease of use
- \* 16 channels
- \* Includes a step-by-step beginners guide

**ADF14 ROM CARTRIDGE** £13.00

- \* Takes existing ROM software in cartridge form
- \* Cuts down opening of machine to insert ROMs

**ANB28 1770 DFS UPGRADE FOR BBC B** £39.00

- \* Allows BBC to access disc drives
- \* Will take ADFS for double density

**ANB29 ADFS ROM FOR 1770 OR BBC B+** £23.00

- \* For use with BBC B+
- \* For BBC B with 1770 DFS kit
- \* Double density
- \* Hierarchal filing structure

**ANB27 64K UPGRADE KIT FOR B+** £35.00

- \* Upgrades B+ to 128K
- \* Sideways RAM

**ANC06 32016 CO-PROCESSOR** £999.00

- \* 32 bit processor
- \* Complete with Fortran, Iso-Pascal, Cambridge Lisp, Panos, C, BBC Basic & 32016 Assembler
- \* 1 megabyte RAM

**ANC01 6502 2nd PROCESSOR** £159.00

- \* Complete with 64K Hi-Basic
- \* Compatible with B, B+ and Master

**ANC04 Z80 2nd PROCESSOR** £329.00

- \* 64K CPM
- \* Complete with vast range of business

# ECONET

**AMB12 BBC MASTER ET 128K** £320.00

- \* No DFS
- \* Econet station
- \* 128K memory

**ADF10 ECONET MODULE FOR MASTER 128** £49.00

- \* Upgrades Master 128 for networking
- \* Easy to install plug-in module

**PTC11 ECONET KIT** £55.00

- \* Upgrades BBC B or BBC+ (please specify when ordering)
- \* Must be professionally fitted

**AEH18 10 STATION LEAD SET** £25.00

**AEH19 ECONET STARTER KIT** £79.00

**AEH21 ECONET SOCKET KIT** £29.00

**AES22 PRINT SERVER** £40.00

- \* Allows a BBC to be a printer server when Econetted

**AND61 10 MEG WINCHESTER WITH FILE SERVER** £999.00

- \* Plugs into 1 meg bus
- \* Complete with ADFS and file server manuals
- \* Built in fan and power supply

# DRIVES

**All Disc Drives Now Have A Two Year Warranty**

**PTC03 SINGLE DISC DRIVE** £99.00

**PTC06 SINGLE DISC DRIVE inc PSU(MITSUBISHI)** £119.00

**PTC01 DUAL 40/80TK DRIVES (MITSUBISHI)** £189.00

**PTC02 DUAL 40/80TK DRIVES inc PSU (MITSUBISHI)** £215.00

**PTC04 DUAL DISC DRIVES (MITSUBISHI)** £249.00

- \* In monitor bridge (Master size)
- \* Built in power supply

**PCT10 400K DISC DRIVE AND 20 MEGABYTE WINCHESTER** £799.00

- \* In monitor bridge (Master size)
- \* Built in fan and power supply
- \* Other size Winchester available

# PRINTERS

**EPSON RX100+** £179.00

- \* 100 CPS wide carrier printer
- \* IBM compatible
- \* Extremely robust
- \* Complete with tractor feed

**JUKI 6100 PRINTER** £250.00

- \* 18CPS
- \* Standard Ribbons
- \* Very Reliable
- \* Centronics Interface



## PRINTERS

### MP165 DOT MATRIX PRINTER £199.00

- \* 165CPS Draft Print
- \* 38CPS Near Letter Quality
- \* Built In Tractor Feed
- \* Epson Compatible
- \* Downloadable Character Sets

### EPSON LX80 £225.00

- \* 100 CPS
- \* NLQ mode
- \* Centronics interface

### EPSON LX80 TRACTOR FEED £18.00

### EPSON LX80 SHEET FEEDER £49.00

### EPSON FX85 £399.00

- \* 160 CPS
- \* Downloadable character set
- \* Centronics interface

### EPSON FX105 £499.00

- \* As above with wide carriage

### EPSON FX85 TRACTOR FEED £37.00

### EPSON LQ800 £595.00

- \* 24 pin head
- \* 180 CPS
- \* Excellent neat letter quality

### EPSON LQ1000 £795.00

- \* Wide carriage version of above

### KAGA TAXAN KP810 £229.00

- \* Low cost NLQ printer
- \* built in tractor feed
- \* 160 CPS

### KAGA TAXAN KP910 £389.00

- \* Wide carriage version of above

### BROTHER HR15 £299.00

- \* Daisy wheel printer
- \* Optional keyboard available
- \* 15 CPS

### BROTHER M1509 £399.00

- \* 180 CPS
- \* Built in tractor feed
- \* RS232 and Centronics interface
- \* IBM compatible
- \* Full international character set
- \* Epson compatible

## MONITORS

### COLOUR

### HANTAREX COLOUR MONITOR £159.00

- \* Medium resolution
- \* RGB interface
- \* Composite video and sound input
- \* Anti-glare filter

### MICROVITEC 1451 COLOUR £235.00

- \* Medium res monitor
- \* Metal or plastic case
- \* RGB interface
- \* Complete with cable for BBC

### MICROVITEC 1451 A/P £275.00

- \* As above with audio and composite video input

### MICROVITEC 1441 COLOUR £450.00

- \* High resolution monitor
- \* 895 pixels
- \* RGB interface

### TAXAN SUPER VISION 3 £349.00

- \* Compact 12 inch super high resolution RGB colour display
- \* Text switch gives green display
- \* Super high contrast tube
- \* 640 x252 line resolution
- \* 0.37 dot pitch

### MONOCHROME

### HANTAREX BOXER £69.00

- \* High res green monitor
- \* As preferred by educational establishments

### KX 1201 KAGA GREEN (P31) £89.50

### KX1202 KGA GREEN (P39) £95.50

### KX 1203 KAGA AMBER (PUL) £95.00

- \* P31 standard persistence
- \* P39 long persistence
- \* PUL long persistence
- \* Greater than 20MHz bandwidth
- \* Flat 635R tube
- \* 1000 line resolution at centre

**Peartree Computers Ltd.**  
**Telephone (0480) 50595**

## SOFTWARE

With every 3 ROMS purchased we will supply a MR3000 ROM board at no extra cost

### PEARTREE SOFTWARE

### 16 K PRINTER BUFFER £9.00

- \* for Master or BBC B+
- \* Will Work in BBC B With Sideways Ram
- \* Supplied on 40/80 track disc

### DOSCOPY £14.95

- \* BBC < > MS DOS
- \* Copies to or from many different disc formats
- \* Apricot, Amstrad, IBM, Atari and many more
- \* For Master, BBC B+ or BBC B with 1770 DFS
- \* compatible with many 1770 dfs kits

### ROM MANAGER £9.95

- \* 16k ROM
- \* Only for BBC B
- \* Contains Ram Editor, Rom Switch, Rom list
- \* Rom Checker, Image Saver, Image loader
- \* Basic To Rom Image Converter

### COMPUTER CONCEPTS

### WORDWISE £32.00

- \* Model 7 editing
- \* Preview in mode 0 (80 cols)
- \* Can produce ASC11 text for modems

### WORWISE PLUS £45.00

- \* As above with multi document editing
- \* built in programming language for data handling

### INTER SHEET £45.00

- \* 40, 80 and 105 column mode
- \* Multiple spreadsheets in memory
- \* 64 by 255 sheet size
- \* ROM link

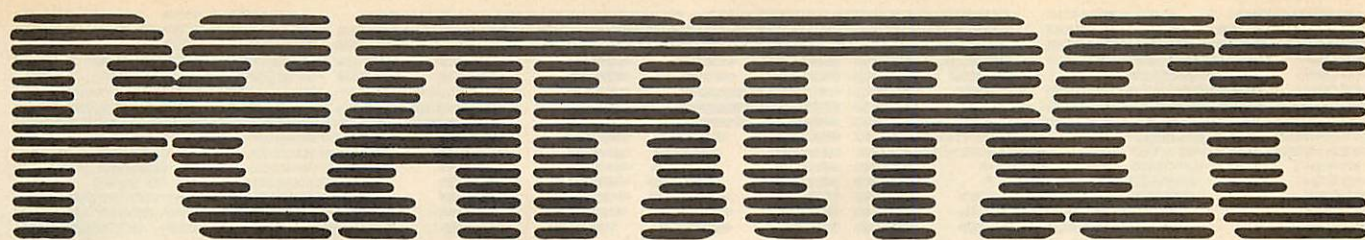
### INTER CHART £30.00

- \* Built in Epson screen dump
- \* Supports pie, line and bar charts
- \* Line and bar graphs can be displayed on the same axis
- \* Automatic scaling
- \* ROM link

### INTER-WORD £45.00

- \* 80 or 105 column word processor
- \* Continuous documents limited to disc size
- \* Editing operations similar to Wordwise
- \* ROM link





## SOFTWARE

### INTER BASE £55.00

- \* Compatible with all filing systems
- \* Contains powerful Basic-like programming language
- \* Card index mode
- \* Powerful customising mode
- \* Max 250 fields per record
- \* Max 32K per field
- \* Variable field lengths and records
- \* ROM link

### ACCELERATOR £51.00

- \* Basic compiler
- \* Can produce ROM/RAM format code from Basic programs
- \* Comprehensive manual

### CARETAKER £26.00

### TERMI 2 £28.00

- \* VT52 terminal emulation
- \* Complete with file transfer software
- \* Easy to use menu options
- \* Custom configurations can be stored on disc

### COMMUNICATOR £55.00

- \* As above with VT100 emulation

### SPEECH ROM £25.00

- \* Must be used with Acorn speech processor
- \* Liven up your programs

### ACORNSOFT

### VIEW 3.0 £58.00

- \* Industry standard word processor
- \* Complete with printer configuring utility
- \* Can be used in any mode
- \* BBC B, BBC B+, 6502, Shadow RAM, DFS and ADFS compatible
- \* Complete with comprehensive manual

### VIEWSHEET £42.00

- \* Compatible with complete View range
- \* Can be used in any mode
- \* Windows can be selected for printing

### VIEWSTORE £38.00

- \* Complete with report generator
- \* file size limited only by disc storage size
- \* Data can be imported from other View products

### VIEW SPELL £33.00

- \* Spelling checker for View
- \* Complete with 70000 word dictionary
- \* Dictionary can be extended to include technical terms

### VIEW PLOT £25.00

- \* Enables you to draw line, bar or pie graphs
- \* Compatible with Viewsheets

### VIEWINDEX £15.00

- \* For View
- \* Automatically creates index
- \* Notes page numbers
- \* Sorts alphabetically

### VIEW PRINTER DRIVER GENERATOR £9.00

- \* Used to personalise View documents to include special printer features

### GXR GRAPHICS £23.00

- \* Extends plot and VDU commands to provide: circle plotting, ellipses, parallelograms, dotted and dot dash patterns, shading patterns, colour fill, shade fill and sprites
- \* Built in sprite designer
- \* Please specify BBC B or BBC B+

### ISO PASCAL £52.00

- \* Full implementation of the ISO standard
- \* Can use BBC's sound and graphics
- \* Compiles to a compact intermediate code
- \* Complete with demonstration disc

### LOGO £52.00

- \* Good introduction to computing for children
- \* Turtle graphics supported

### TERMULATOR £27.00

- \* Terminal emulator ANSI (VT100), VT52, Tektronix 4010, dumb terminal, hardcopy terminal and a special BBC terminal
- \* Enables the host computer to be sent directly to the BBC's output driver

### COMAL £39.00

- \* Programming language standard in many European countries
- \* Encourages structured programming

### BASIC EDITOR £25.00

- \* Powerful full screen editor
- \* Many word processor functions included

### MICRO PROLOG £60.00

- \* Designed to emphasise human logic rather than machine procedure
- \* Step closer to artificial intelligence
- \* 6502 compatible

### BCPL £50.00

### BCPL CALCULATION £35.00

### BCPL STAND ALONE

### GENERATOR £35.00

### CREATIVE SOUND £19.00

### BEEBUGSOFT

### TOOLKIT PLUS (ROM) £35.00

### SLEUTH (ROM) £28.00

### ROMIT (ROM) £30.00

### EXMON 2 (ROM) £28.00

### HELP 2 (ROM) £27.00

### SPELLCHECK 3) £32.00

### DUMPMASER 2 (ROM) £27.00

### DUMPMASER (DISC) £13.00

### PROGRAM BUILDER (DISC) £19.00

### DISCMASER (DISC) £19.00

### TELETEXT (DISC) £13.00

### SPRITES (DISC) £13.00

### STUDIO EIGHT (DISC) £19.00

### ICON MASTER (ROM) £30.00

### WORDEASE (ROM) £26.00

### WORDEASE (DISC) £19.00

### MUROM (ROM) £28.00

### QUICKCALC (DISC) £16.00

### HERSHEY FONT (DISC) £19.00

### BILLBOARD (DISC) £21.00

### DESIGN (DISC) £21.00

## LEADS

### PTC50 BBC TO TV £1.25

### PTC51 BBC TO GREEN MONITOR £2.95

### PTC52 BBC TO SONY/KAGA COLOUR MONITOR £5.95

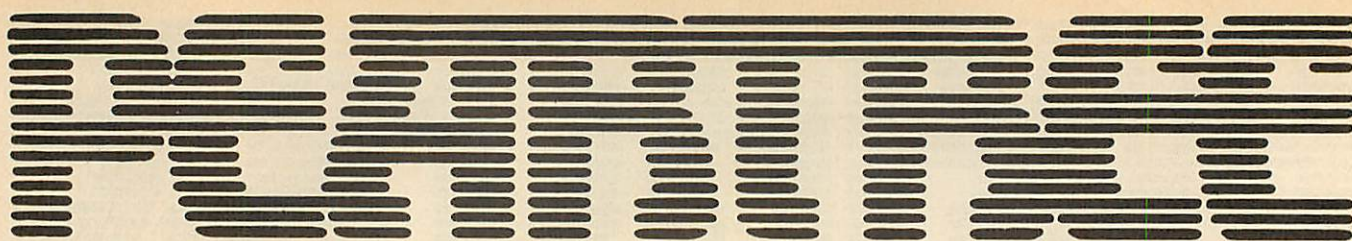
### PTC53 BBC TO MICROVITEC £2.20

### PTC54 PHONO TO PHONO £1.25

### PTC55 BNC TO BNC £2.95

### PTC56 BBC TO CASSETTE £2.25





## LEADS

ACORN CASSETTE	£2.25
PTC58 BBC TO CENTRONICS PRINTER	£9.95
PTC59 BBC TO SERIALPRINTER	£8.95
PTC60 4 WAY MAINS TRAILING SOCKET	£9.50

- \* Including two metre extension cable plus plug

## MODEMS

### MAGIC MODEM £65.00

- \* V21/23 1200 1200/75 300/300 Baud Rates
- \* Auto Answer and Auto Dial
- \* BT Approved
- \* Complete With Lead

### COMMSOFT SOFTWARE £33.00

- \* Software For The Magic Modem
- \* Easy to use
- \* Full Auto Dial Application

### PAGE NIGHTINGALE £109.00

- \* 1200/75 75/1200 300/300 baud rates
- \* British telecom approved
- \* Complete with cable for BBC computer
- \* Socket for through connection of telephone

### PAGE NIGHTINGALE COMBO £129.00

- \* As above with Commstar software

### PAGE ACCESSORY BOARD £42.00

- \* Autodialler
- \* Auto baud rate selection via software
- \* Autoanswer for your own bulletin boards
- \* Built in loudspeaker for monitoring

### PAGE AUTODIAL DISC £9.00

- \* Sets up Commstar for autodial
- \* Stores favourite numbers

### PAGE OBBS £20.00

- \* To be used with the accessory board
- \* Create your own bulletin board
- \* Create your own office answering service

### MINOR MIRACLES WS2000 £125.00

- \* Full range of baud rates
- \* British telecom approved
- \* 25 way RS232 input

### CABLE FOR MODEM £5.00

### WS2000 AUTODIAL CARD £30.00

### CABLE FOR AUTODIAL £4.00

### SK1 KIT £10.00

### WS2000 AUTOANSWER KIT £30.00

### WS3000 V21/23 MODEM £285.00

- \* Hayes compatible
- \* Intelligent speed buffering
- \* Line noise filtering
- \* Internal battery backup allows 63 names and numbers to be stored
- \* Printer port for direct connection to a printer
- \* Includes cable

### DEMON MODEM £76.00

- \* Autodial, autoredial
- \* Auto answer
- \* Full and half duplex
- \* CCIT and bell
- \* Complete with mains supply, manual and ROM

### DIAL DISC £4.50

## SUPPLIES

### RIBBONS FOR DOT MATRIX PRINTERS £4.50

- \* FX/MX80/LX80 printer
- \* Juki 5510 printer
- \* MP 165 printer

### RIBBON FOR KAGA KP810 CANON PW1080 £5.00

### RIBBONS FOR 132 COL PRINTERS £7.00

## BOOKS

### THE EPSON PRINTER COMMANDS REVEALED

- \* A must for all printer users
- \* Commands for all Epson compatible printers
- \* Easy to understand commands
- \* Detailed explanations

£5.95

### MASTER REFERENCE PART ONE £14.95

### MASTER REFERENCE PART TWO £14.95

### VIEW MANUAL £10.00

### VIEWSHEET MANUAL £10.00

### DFS OPERATING SYSTEM MANUAL £6.95

### ADVANCED USER GUIDE FOR BBC £14.95

## COMPONENTS

### BBC KEYBOARD £29.00

### BBC CASE £29.00

### BBC K/BOARD RIBBON £2.50

### EPROMS 27128 £3.50

### 8K RAM 6264 £3.50

### MAIN EDUCATIONAL SUPPLIER

We accept Government and Educational orders. If there are any products not listed above that you require, please enquire.

### PEARTREE COMPUTERS LTD.

T'phone (0480) 50595

Fax (0480) 57572

Teletex 944 480 412 685



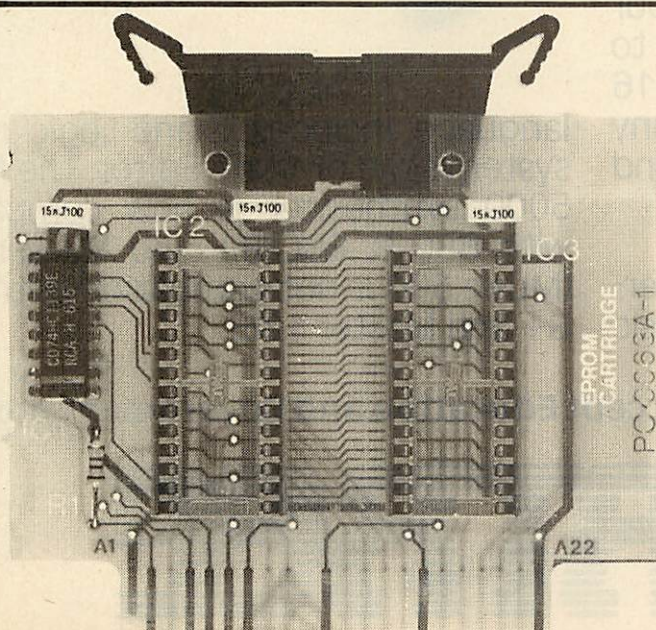
# PEAR1

## The All in One System £799.00

20 Megabyte Acorn Compatible  
Hard Disc with 5 1/4"  
DISC DRIVE BUILT IN

- ★ In Master Bridge
- ★ Built in Fan
- ★ Through Power Connector  
for Monitor
- ★ Can be supplied with  
Level 3 File Server

The above system is compatible  
with BBC B, BBC B+ and Master.  
For machines other than the  
Master please order an  
ADFS Rom.



IN STOCK NOW

**Pear1  
Master  
Cartridge  
only £5.95**



# SOUNDS SPECTACULAR



Take it home — Plug it in to your computer and hi-fi system and start to make spectacular sounds using up to 16 sounds at once selected from the many preset instruments, waveforms and envelopes provided.

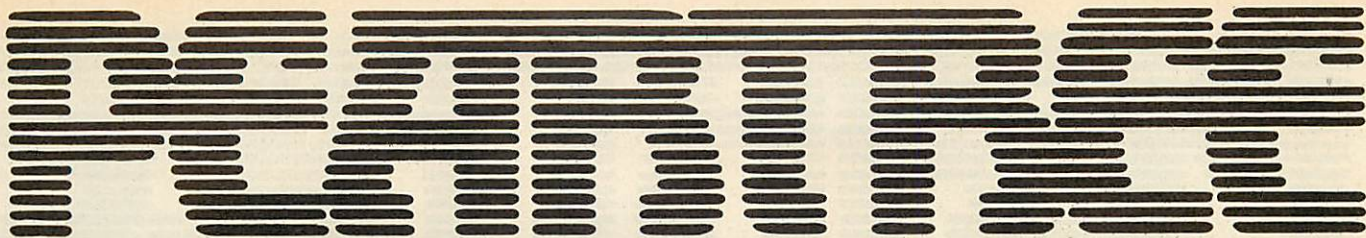
The new AMPLE Romeasy to use, powerful and versatile menu driven music

language. Includes 'Island Logic' music system style of Staff Editor. The Music 5000 synthesiser is now compatible with BBC B, BBC B+ and Master 128 (Music 500 is not compatible with BBC B+ and Master 128)

**Dealer enquiries welcomed. We accept Education and Government orders**

# PEARTREE





# BBC IN SERIOUS CLOTHING

NEW LOW PRICE NOW ONLY £173.00 + VAT



## KBL 128 PC £599.00

- \* BBC B+ board with 128K
- \* 86 key IBM style keyboard
- \* Dual 40/80 track disc drives
- \* All sockets at rear for easy access
- \* Infra red keyboard option supplied as standard
- \* Easy access to BBC B+ board for changing ROMs etc

## KBL 0 PC

KEYBOARD, CASE, CABLES, FAN £173.00

### PLUS OPTIONS

INFRA RED REMOTE CONTROL	£24.00
BBC B BOARD	£299.00
BBC B+ BOARD 64K	£325.00
BBC B+ BOARD 128K	£385.00
DUAL DISC DRIVES 80 TRACK	£199.00
6502 2ND PROCESSOR	£159.00
Z80 2ND PROCESSOR	£329.00
TORCH Z80 2ND PROCESSOR	£199.00
<b>FITTING</b>	
DRIVES SINGLE	£5.00
DUAL	£9.50
COMPUTER	£17.00
CARRIAGE	£12.00

## MEGAMOUSE

- \* Fully AMX compatible
- \* Because of all of this it is a popular AMX replacement



MEGAMOUSE £49.00

- \* High quality UK manufactured
- \* Highly accurate
- \* Slip free rubber coated ball

MEGAMOUSE AND SUPERART £95.00

MEGAMOUSE AND PAGE MAKER £95.00

AMX MOUSE WITH NEW SUPERART ROM AND DISC £65.00

AMX DESK £19.00

AMX UTILITY £11.50

AMX SUPERART £43.00

AMX PAGE MAKER £43.00

AMX 3D ZICON £21.00

AMX DATABASE £21.00

AMX XAM £21.00

## WATFORD ELECTRONICS BEEB VIDEO DIGITISER £99.00

- \* Input from any 1V video source
- \* Can be used with Artist package
- \* 1.6 seconds scan time
- \* Slow scan television; sending images via a modem or radio
- \* Security
- \* Full resolution in modes 0, 1 and 2
- \* Up to 8 grey levels
- \* Manual or auto level control
- \* Connects to user port
- \* ROM software supplied

## MAGAZINE MAKER £125.00

- \* Watford video digitiser and AMX Pagemaker
- \* Pictures produced by digitiser can be doctored to make up pages complete with text
- \* Complete package at a bargain price



# PEAR TREE

## Means Business

Pear Tree Computers Ltd. 12:00 01-10-85

PEAR TREE SOFTWARE  
MAIN SYSTEM MENU

- 1 Stock Control
- 2 Customer Data Base
- 3 Purchase Ledger
- 4 Sales Ledger
- 5 Nominal Ledger
- 6 Invoicing and Credit Notes
- 7 Proforma Quotation
- 8 Petty Cash Control
- 9 Bank A/C Control
- C Create Data Disks
- E Exit from Main System

PLEASE CHOOSE ANY SYSTEM TO RUN

**PROFIT**  
A complete business  
system for only  
**£69**

### The first complete, integrated business package for the BBC Micro

Running a business isn't easy, but Pear Tree can help make it simpler with the most cost effective business software package on the market today – Profit.

Profit is compatible with all disk filing and advance disk filing systems for the BBC B, BBC B+ and MASTER 128.

Developed for Pear Tree's own compatible KBL 128 PC, Profit is as easy to use as ABC. Everything you require in running a business is there – accounts, stock control, customer data base and even the immediate status of your bank account.

With Profit, all the time consuming problems, the reams of paperwork and valuable hours taken in administration can all be condensed down far more efficiently. The

net result is that you have far more time to concentrate on making your company grow.

Profit is simply a way to help you control your business more profitably. Complete the coupon today and start to profit from the software designed for your business.

### PEAR TREE PROFIT

*'Profit' is now held in high esteem in both the business and computer worlds: "This represents good quality Business Software compared to others on the market and I can recommend it."*

*(ACORN USER magazine review, April 1986)*



# PEAR TREE

## The black and white case for colour

Pear Tree are now offering the most powerful art package yet devised for the BBC Micro – Artist.

Artist is a new 16k language ROM compatible with the BBC Micro, BBC + and the new Master Series, allowing full manipulation of a mode-2 screen. With Artist and Megamouse, colour graphics take on a completely new dimension, which has to be seen to be believed.

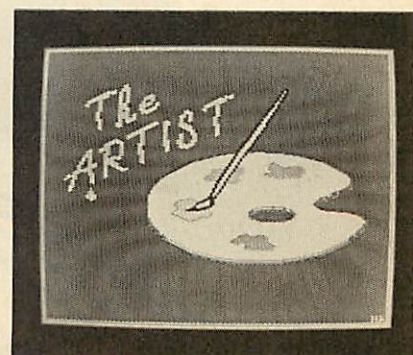
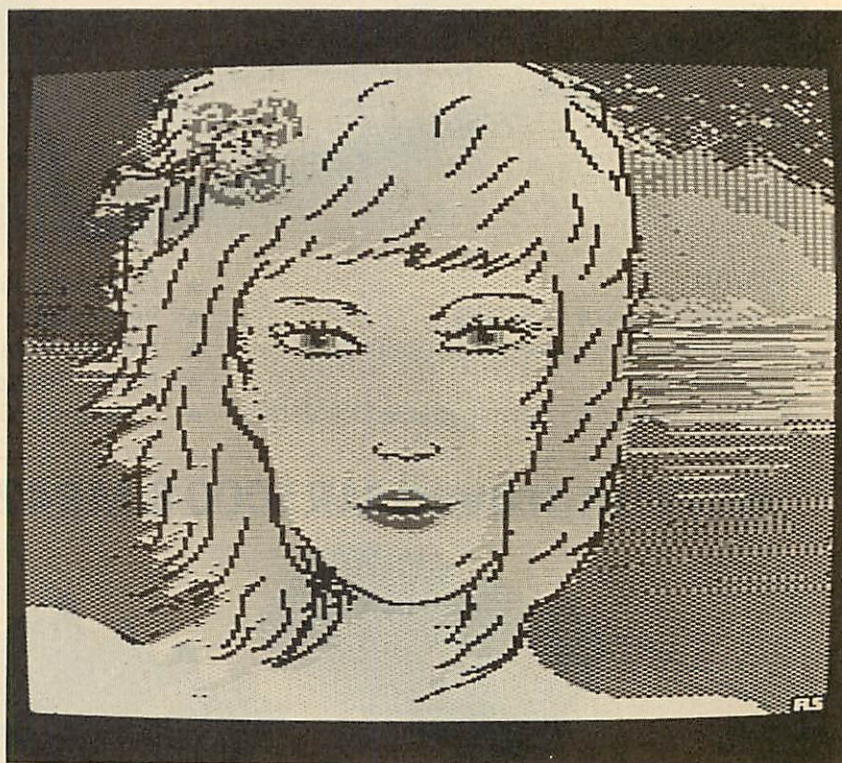
Copying specific screen areas to exclude certain colours. Drawing and painting underneath any colour combination. Making your brush cycle through a defined colour sequence. Colour pattern editing. Sprites of any size. Animation. Just a hint of how Artist is the most highly advanced software package yet designed, with features never before seen on the BBC Micro. The only limitation of Artist is your imagination.

With the ultimate in art packages comes the ultimate mouse – Megamouse. Built to professional standards and comfortably shaped, it provides sensitive, accurate movement, that is unbeatable.

This exclusive Pear Tree offer includes the Artist ROM, the systems disc, a users manual and an excellent grey shade Epson printer dump.

You have the option of buying the Megamouse separately, or saving £10 by buying the complete package.

Artist is already ahead of its time. Don't be left behind – order now before it's too late.



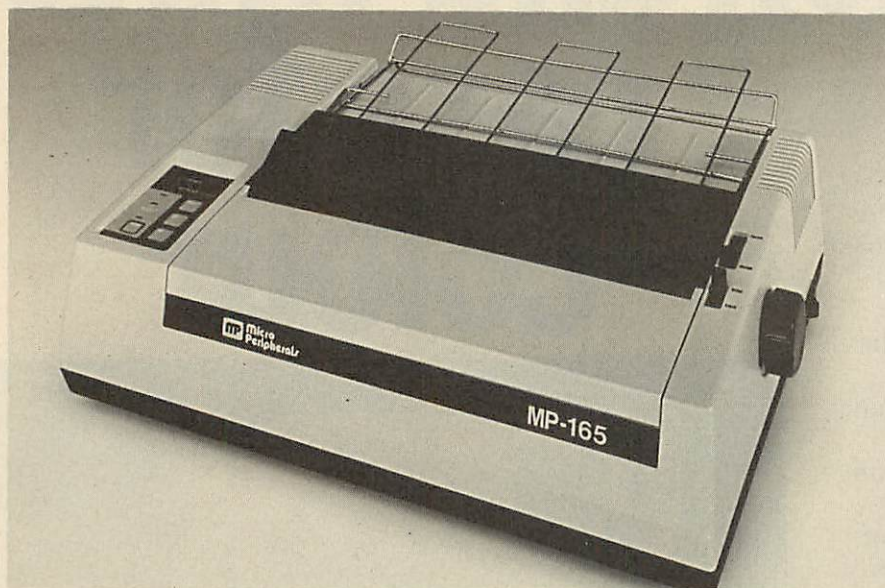
The Artist is compatible with the AMX Mouse and the Megamouse is compatible with the AMX Software.

Artist Software	£45.00
Megamouse	£49.00
Artist and Megamouse	£85.00



# PEARTREE

## MP165 at a new low price of £199

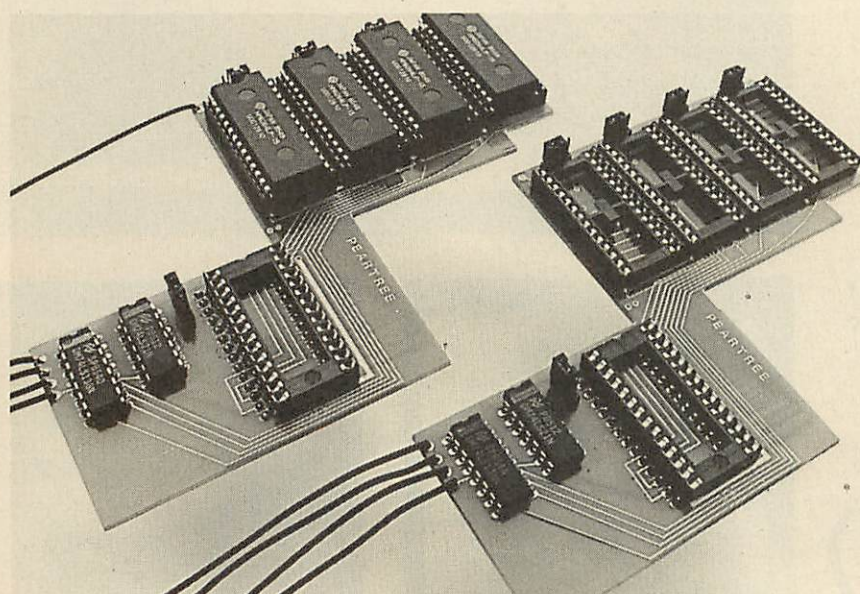


The latest generation of low cost near letter quality Epson compatible dot matrix printers giving you a super fast standard quality print at 165 CPS and a superb 40 CPS in NLQ. This printer will do all your work, print your important correspondence, print your listings, print your graphs or even dump graphics straight from your computer.

### Features

- ★ Draft Speed of 165 C.P.S.
- ★ Near Letter Quality Speed of 38 C.P.S.
- ★ 2K Buffer
- ★ Maximum of 95 Downloadable Characters
- ★ Centronics Interface
- ★ Very Reliable
- ★ Excellent Graphics Quality
- ★ Built In Tractor Feed
- ★ Fully Epson Compatible

## NEW Improved MR3000 & MR4200



### MR3000 Mini-Rom Board:

Gives 4 extra Rom sockets on BBC 'B'.  
Only £13.00. Full instructions enclosed.

### MR4200 Mini 32K Ram Board:

Inclusive of the Hitachi 6264LP-15 Ram.  
Full Software inclusive. Add £1.00 for no solder version of either board.  
Only £26.00

## PEARTREE COMPUTERS

### HOW TO ORDER

Bulk order discounts are available on some items. Government and Educational orders are welcome. Orders will whenever possible, be despatched on the same day.

All prices quoted exclude VAT and P & P. Postage will be charged as follows:

Items below £10.00	add £1.50
Items below £50.00	add £2.50
Items below £100.00	add £3.50
Items over £100.00	add £8.00

We accept



Telephone Orders: (0480) 50595



# TURTLE GRAPHICS GROWS UP

Extend the possibilities of the Logo language's popular turtle graphics by using the Master's extra facilities or the Graphics Extension ROM with the BBC micro

**Joe Telford**

I have a love-hate relationship with the Logo language. Despite its problems it is still one of the few languages which can be usefully applied by beginners and experienced users alike. Complete acceptance of Logo and its consequent improvement await the development of a machine specifically designed to support the Logo philosophy. A half-way house can be seen in the Amstrad 8256 which sensibly 'bundles' Logo as a part of the package – something I've been saying Acorn should do for the last four years.

The facilities which most Logo-users begin with (and few escape from) are the turtle graphics. We may all have investigated the wonderful properties of 'squareness' with an appropriate Logo procedure:

```
TO SQUARE side
```

```
  REPEAT 4[FD :side LT 90]
```

```
END
```

so that typing SQUARE 200 will draw a square of side 200 turtle units. The approach to graphics using Logo might well be termed 'body geometry' because we can actually stand up, then walk the path of the screen turtle to achieve the same result. So FD 200 LT 90 can be replicated by our body and this movement can be repeated four times.

However, ask any primary school teacher about children's mathematical experiences with squares. Certainly many 11-year-olds are only too familiar with the idea of 'squareness'. What then do we do with the 16-year-old computing student who uses Logo? Squares? You appreciate the problem. Logo is about acquiring concepts in problem solving, with either programming as the main *raison d'être* or another subject (like maths or English). In either case, we must build on the concepts formed in earlier years, rather than repeating them.

The BBC micro's add-on *Graphics Extension ROM (GXR)* which is part of the Master series operating system provides an excellent

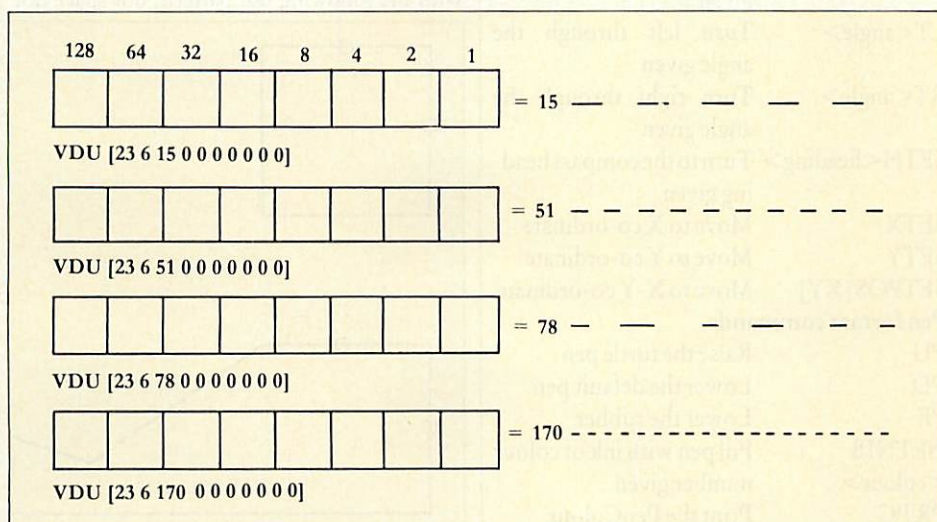


Figure 1. Typical dot patterns set by VDU 23 6 etc

way of extending turtle graphics activities, and encouraging the development of concepts relating to cartesian (graph) geometry, which is based on X-Y co-ordinates.

## Which Logo?

The Logo commands demonstrated in this article refer to the Logotron version of Logo. You can make the slight amendments necessary to use your own version of Logo simply by using your Logo manual to cross reference commands given here.

If you have a BBC micro or a B+ with the GXR then make sure that the GXR is selected, before starting Logo. Once Logo is started, it selects mode 4 automatically. If a Master or a B+ is used, get some extra memory by typing:

```
*SHADOW
SETMODE 1
RECYCLE
CS WINDOW
PR NODES
```

This gives more workspace and also four screen colours to work with. Note that SETMODE <128+n> does not work in Logotron Logo.

Most turtles have a field with three different sorts of boundary:

- WRAP, a boundary which reflects turtles
- FENCE, a boundary which stops turtles
- WINDOW, a fence which has been knocked down.

When using Logo with the extended graphics facilities of the BBC system it is easiest to select WINDOW, as the other fencing commands can cause problems.

The simple process of FD 200 involves a number of actions by the Logo interpreter. First the turtle is redrawn in an inverted colour plot to make it vanish. Next the end point of FD 200 is calculated and a line is drawn to that point in the current pen colour. Next the turtle is redrawn in an inverted colour plot so that it re-appears at the end of the line.

Later, we will find some instances where redrawing the turtle causes some of the extended graphics effects to be switched off.

The other movement involves turning the turtle: LT 45 involves further actions by the Logo interpreter. The turtle must be inverse-plotted to blank it out, the new direction must be calculated and stored as a system variable,



# JOE'S JOTTINGS

and finally the turtle must be re-drawn to indicate the new direction of travel. Again these plottings can affect some of the extended graphics effects.

There are a number of commands which we will need to be aware of when extending the turtle's drawing facilities.

## Reset commands

**HOME** Move to centre of field (drawing if PD)  
**CS** HOME turtle. Clearfield. Set default PD and ST

## Movement commands

**FD<distance>** Go forward the distance given  
**BK<distance>** Go backward the distance given  
**LT<angle>** Turn left through the angle given  
**RT<angle>** Turn right through the angle given  
**SETH<heading>** Turn to the compass heading given  
**SETX** Move to X co-ordinate  
**SETY** Move to Y co-ordinate  
**SETPOS[XY]** Move to X-Y co-ordinate

## Pen format commands

**PU** Raise the turtle pen  
**PD** Lower the default pen  
**PE** Lower the rubber  
**.SETNIB** Fill pen with ink of colour number given  
**<colour>**  
**PR PC** Print the PenColour

## Other general commands

**ST** Show the turtle  
**HT** Hide the turtle  
**VDU[a b c . . . n]** Perform BBC VDU command

When CS or PU PD are typed the turtle drops its default pen onto the screen. This uses ink from the SETPC command, and when it moves it draws a continuous straight line. Its nib type is .SETNIB 5, but this is set whenever the default pen is dropped. Dropping it is the easiest way to reset the pen from any extended graphics nib.

## Nibs for the pen

Logo has a concept of altering the 'style' of the turtle's imaginary pen nib, to achieve different graphics effects. This is explained in the Logo manual, but only refers to two specific nibs. The command which changes the pen-nib is .SETNIB <type> where type is a specific number between 0 and 255. Explorations in the Telford Towers Logo-Lab indicate that maximum success can be achieved by starting with .SETNIB 5 (the default nib) then increasing the nib in multiples of eight, ie, .SETNIB 13, .SETNIB 21, .SETNIB 29, etc. However, even then we need to understand how each pen

type relates to the BBC graphics environment. .SETNIB <type> actually sets a system variable in Logo which corresponds to the first parameter of the Basic keyword PLOT so that .SETNIB 5 corresponds to type=5, while .SETNIB 5 FD 100 actually activates the PLOT COMMAND:

PLOT type, 0,100 (for example)  
 Armed with this information, we can see how to set up Logo to draw with the special-effects nibs provided by the GXR or available on the Master.

Begin with a simple nib, available on the standard BBC micro. Type:

CS .SETNIB 21 FD 200  
 This compound command draws a dotted line with the following dot pattern: dot space dot

experiment with others.

To set any of these values in Logo simply type the following:

VDU[23 6 15 00000000]  
 Of course such a command is not immediately meaningful, and hence we should really define a Logo word to perform the task:

TO DOTS: value  
 VDU (SE[23 6]:value[00000000])  
 .SETNIB 21  
 END

The complexity of the VDU line is caused because Logo VDU commands are required as lists rather than numbers. The sentence primitive (SE . . . ) combines a set of two or more lists to form a large list in which each element is decoded, so :value will actually be a real num-

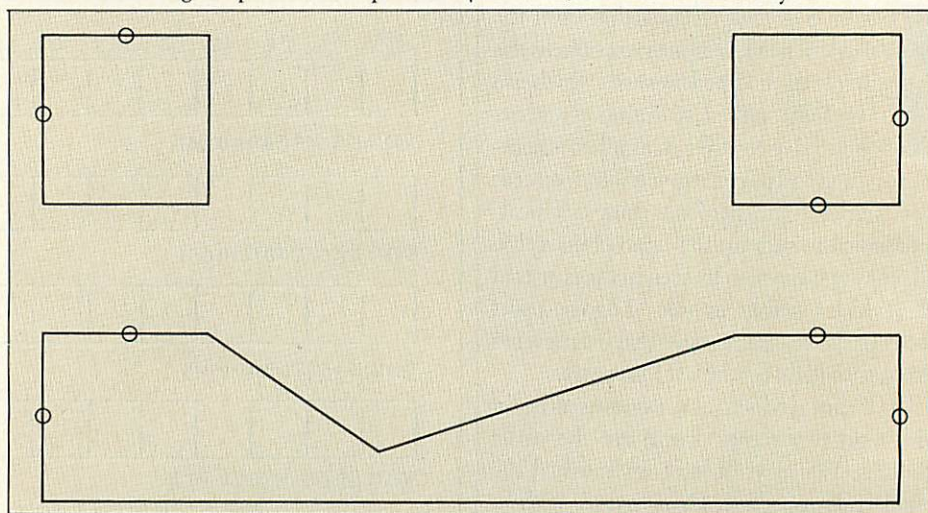


Figure 2(a) and (b). The two squares we want to draw, followed by what is actually drawn

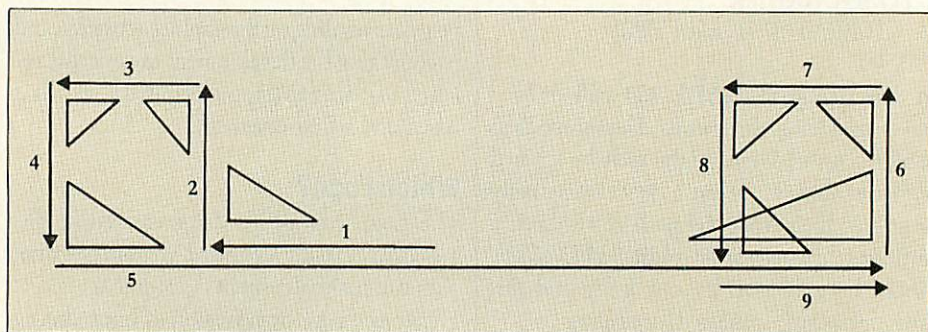


Figure 2(c). How the triangle drawing works

space dot space.

This is perfectly satisfactory, but the extended graphics commands allow us to control the dot pattern more precisely. To do this we need to use a VDU command:

VDU[23 6]  
 followed by the value to set the dot pattern over the first eight pixels. This must be followed by seven 0's to complete the VDU 23 command. Look at figure 1 to see the effect of different values for the dotted line. Notice that the range of the value is from 0 (no line) to 255 (continuous line). Useful values include 1,15,51,78 and 170, though you should always

ber inside the list. Try typing:

CS DOTS 15 FD 200  
 LT 90 DOTS 51 FD 200  
 LT 90 DOTS 78 FD 200  
 LT 90 DOTS 170 FD 200

If we save the DOTS tool, then quite young children can make use of dotted lines, because they are protected from the confusion of the VDU commands. Before leaving the dotted lines, try altering the pen colour:

CS DOTS 15 FD 200  
 SETPC 2 LT 90 DOTS 51 FD 200  
 SETPC 3 LT 90 DOTS 78 FD 200  
 SETPC 2 LT 90 DOTS 170 FD 200



Also consider how mixed colour lines can be achieved. One way is:

```
CS FD 200 HOME
SETPC 2 DOTS 15 FD 200
```

but there are others.

We are already moving towards forming a set of rules for using Logo with the extension graphics facilities of the BBC system. The first rule should be if in doubt – move about. In other words only lower the pen and set a particular nib if we want something to happen. General moves and homes for example are safest done with PU.

There are two nibs which fill horizontal lines, and which can be used on the BBC micro to form a crude 'PAINT' facility. Try typing:

```
CS .SETNIB 77
REPEAT 50 [FD 4]
```

which gives a full line fill right and left until it encounters a line in a foreground colour, while

```
HOME SETPC 3 .SETNIB 94
REPEAT 50 [FD 4]
```

gives a line fill only to the right and until a background colour is reached. Users without Masters or GXR can use this facility to paint in shapes like circles:

```
CS SETPC 1 RT 90 REPEAT 36 [FD 20 LT 10]
HOME SETPC 2 .SETNIB 77 REPEAT 56 [FD 4]
PU HOME
```

Still with the standard BBC micro, there is a facility to fill in triangular shapes. This is done by typing:

```
CS .SETNIB 85
FD 200 LT 90 FD 200
```

The triangle only appears when the second point is reached. This can be extended to squares by typing:

```
TO FILL SQUARE :size
.SETNIB 85
REPEAT 4 [FD :size LT 90]
END
```

Then CS FILL SQUARE 200 will fill an appropriate sized square. However, suppose we want to draw the two squares of figure 2a. The procedure would seem to be:

```
CSPU LT 90 FD 400 RT 90
FILL SQUARE :200
PU RT 90 FD 800 LT 90
FILL SQUARE :200
PU HOME
```

but the result, shown in figure 2b, is not what we want.

The reason we get such a confused picture is because of the way in which the BBC micro series handles the .SETNIB commands passed from Logo. It would be logical to think that because every triangle needs three corners or X-Y co-ordinates, then the turtle start point would be one co-ordinate; the first corner of

the triangle would be the second and the eventual turtle position would be the third.

This seems great except for the way that the Beeb interprets triangle plotting. So if we turn triangle plotting on with .SETNIB 85, then the last two turtle positions are re-read to form a triangle, which may not be the triangle we want to draw. Even worse, as we move, these last two positions are updated so that the turtle always draws a triangular trail.

Look at figure 2c and trace the order of triangle drawing.

The cure for this problem is to move between shapes filled with triangles by using PU and then running on the spot for two paces before .SETNIB 85 is used. Try out the following alternative:

## Command Facility

.SETNIB 5	Draw continuous line <sup>1</sup>
.SETNIB 21	Draw dotted line <sup>1</sup>
.SETNIB 69	Plot end point of line <sup>2</sup>
.SETNIB 77	Fill line right/left to non-background <sup>1</sup>
.SETNIB 85	Fill triangle <sup>3</sup>
.SETNIB 93	Fill line right to background <sup>1</sup>
.SETNIB 101	Fill rectangle <sup>4</sup>
.SETNIB 109	Fill line right/left to foreground <sup>4</sup>
.SETNIB 117	Fill parallelogram <sup>5</sup>
.SETNIB 125	Fill line right to non-foreground <sup>4</sup>
.SETNIB 133	Flood fill to non-background <sup>4</sup>
.SETNIB 141	Flood fill to non-foreground <sup>4</sup>
.SETNIB 149	Draw circle outline <sup>6</sup>
.SETNIB 157	Fill circle <sup>6</sup>
.SETNIB 165	Fill circular arc <sup>4</sup>
.SETNIB 173	Fill circular segment <sup>4</sup>
.SETNIB 181	Fill circular sector <sup>4</sup>
.SETNIB 189	Move rectangular area <sup>4</sup>
.SETNIB 191	Copy rectangular area <sup>4</sup>
.SETNIB 197	Draw ellipse outline <sup>4</sup>
.SETNIB 205	Fill ellipse <sup>4</sup>

Notes: <sup>1</sup> Common to all BBC series, uses one previous co-ordinate; <sup>2</sup> Common to all BBC series, uses no previous co-ordinates; <sup>3</sup> Common to all BBC series, uses two previous co-ordinates; <sup>4</sup> Extended graphics set, no uses previous co-ordinates; <sup>5</sup> Extended graphics set, uses two previous co-ordinates; <sup>6</sup> Extended graphics set, uses one previous co-ordinate.

## Table 1: Nib styles available in BBC graphics

```
CSPU LT 90 FD 400 RT 90
FD 0 FD 0 FILL SQUARE 200
PU RT 90 FD 1000 LT 90
FD 0 FD 0 FILL SQUARE 200
PU HOME
```

The running on the spot idea can be better conveyed by defining a Logo word:

```
TO SPOT :times
REPEAT :times [FD 0]
END
```

So FD 0 FD 0 becomes SPOT 2, and we will use this in future because many of the extended commands behave in this same retrospective way.

## The extended graphics nibs

These really begin when we start to .SETNIB 101 onwards. The complete range of commands is shown in table 1, but they should be interpreted via this text. All the extended nibs are very powerful, and a good deal of practice is required to use them effectively.

Filling a rectangle is achieved by using, .SETNIB 101. The power of the nib can be shown by trying:

```
CSPU LT 45
.SETNIB 101
SETPC 1 REPEAT 4 [FD 100]
SETPC 0 REPEAT 8 [BK 50]
PU HOME
```

While the diagram of figure 2 can be achieved by:

```
CSPU LT 90 FD 400 RT 45
.SETNIB 101 FD 280 BK 280
PU LT 45 BK 1000 RT 45
.SETNIB 101 FD 280 BK 280
PU HOME
```

Remember that the length of a diagonal of a square is roughly 1.4 times the length of the side of the same square. Also remember that the angle of the diagonal to the horizontal decides what sort of rectangle will be drawn. To indulge in rectangle plotting to any great degree will require mastery of graph paper and protractor.

Eventually we will need to make some comparisons between the turtle's field and the cartesian co-ordinate system. This is easiest done on scaled graph paper. Remember that the turtle lives in the centre of the field, and from its home the command FD 100 refers to the position SETPOS [0 100] while LT FD 600 refers to SETPOS [-600 0]. When drawing filled rectangles and many of the other graphics commands, the cartesian system may prove easiest to follow. For example to draw a rectangle 200 high by 300 long to the left of HOME try typing:

```
CS .SETNIB 101 SETPOS [-300 200] PU
.SETNIB 109 allows a horizontal line to be filled left and right of the turtle position. It is similar to .SETNIB 77, except that it will fill over colours until it reaches a left or right boundary line of the same colour as the current SETPC.
```

.SETNIB 117 allows the filling of parallelograms. A typical example is:

```
TO FLOWER :size :petals
MAKE "turn 360/:petals
MAKE "angl (240/:petals)
REPEAT :petals [PETAL :size :turn :angl SPOT 2]
END
```

```
TO PETAL :size :petals
.SETNIB 117
```



# NEW MAIL ORDER RELEASES FROM TORCH COMPUTERS

NOW EVEN MORE POWER FOR YOUR BBC MICRO  
AT SPECIAL MAIL ORDER PRICES

## Graduate II ▶

with uprated motherboard and operating ROM for added IBM compatibility, speed and overall performance

- MS-DOS O/S 8088 16 bit processor
- Twin 360k disc drives
- 256k Ram
- Two hardware expansion slots

**Mail order price £579**  
including VAT

## Torch Unicorn ▶

- Multi-User, fully communicating, low cost UNIX computing
- 10 MHz 68000 plus 5 MHz Z80 processors
- 1024K RAM, 20MB hard disc, 400K floppy disk
- All the power and flexibility of UNIX for only £2870

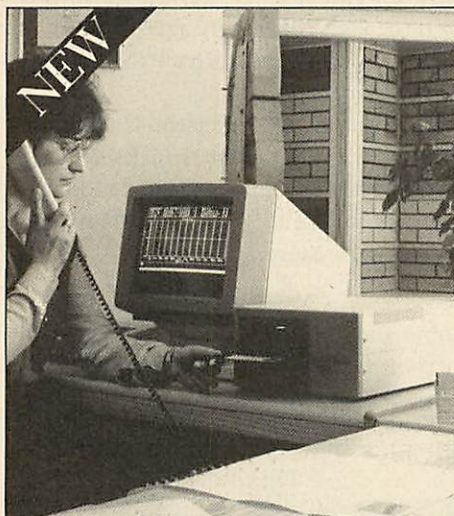
**Mail order price £2870**  
including VAT

The official range of upgrades for the BBC Model B Microcomputer now has an even higher specification and a price tag lower than ever before. Better O/S firmware, improved utilities, new user guides plus free software with all models.

Complete the order form today or telephone (0286) 5005 with your VISA/ACCESS card number.  
Torch Z80 owners send a cheque for 1986 upgrade pack, only £44.95 including VAT and P & P.

**TORCH**  
COMPUTERS 

Torch Computers Ltd., Mail Order Division,  
Cibyn Industrial Estate, Caernarfon, Gwynedd,  
North Wales LL55 2BD. Tel: (0286) 5005



## ZEP 100

Z80 extension processor  
Free software and carry case.

**Mail order price £229**  
including VAT

## ZDP 240

Twin floppy discs and Z80 processor  
Runs BBC-MOS and CP/M compatible software using high quality, double-sided 400K disc drives. Allows storage for BBC DFS and CP/M programs.

**Mail order price £549**  
including VAT

## HDP Z80

Hard disc, floppy disc and Z80 processor  
Adds a massive 20 Mb of hard disc storage, ideal for small business and education environments.

**Mail order price £1794**  
including VAT

To Torch Computers Ltd., Mail Order Division, Cibyn Industrial Estate,  
Caernarfon, Gwynedd, North Wales LL55 2BD.

AU 10

Quantity		Unit Cost	Total	Please tick
Quantity	Graduate(s)	@ £579.00	£	Model B <input type="checkbox"/>
Quantity	UNICORN(s)	@ £2870.00	£	
Quantity	ZEP 100(s)	@ £229.00	£	
Quantity	ZDP 240(s)	@ £549.00	£	Model B + <input type="checkbox"/>
Quantity	HDP Z80(s)	@ £1,794.00	£	
Post and packaging £19.50 per order			£19.50	Master <input type="checkbox"/>
Cheque enclosed for			TOTAL £	
or charge my Access <input type="checkbox"/> Visa <input type="checkbox"/>				

Card No.

Signature

Name

Address

Tel:

Allow 28 days for despatch of goods.

The Graduate is manufactured by Torch Computers under licence from Data Technologies Ltd. Product names referred to are trademarks of the companies of origin.



```
LT:turn + :angl FD :size
RT:angl FD :size PU
BK :size LT:angl
BK :size RT:angl
END
```

```
TO SPOT :times
  REPEAT :times [FD 0]
END
```

Notice that running on the spot is required to prevent confusion of the parallelograms.

There are two extended graphics commands which support flood filling. The first is .SETNIB 133 which sets the nib to flood fill an area bounded by a non-background colour. The second is .SETNIB 141 which flood fills across all colours until a boundary of the current pen colour is reached. For outlined fills use the former, and for full fills without outline use the latter. A suitable Logo word might be PAINT:

```
TO PAINT
  HT .SETNIB 133
  FD 0 ST
END
```

We will have to return to the flood fill later, when we start colour mixing.

## Fast circles

.SETNIB 149 sets the circle outlining nib. A typical command sequence might be:

```
CS .SETNIB 149 FD 200
```

which draws a circle, whose centre is the home point, and whose radius is 200. Try:

```
CS .SETNIB 149 REPEAT 7 [FD 50]
```

You will see that 14 circles are generated because the circle nib behaves like the triangle, parallelogram and rectangle nibs. It uses X, Y co-ordinates retrospectively. The cure is of course to run on the spot. Try:

```
CS
```

```
REPEAT 3 [.SETNIB 149 FD 50 PU FD 50 SPOT 1]
```

We can try all the above with the circle filling nib of .SETNIB 157. Circle drawing becomes confused if we try to leave the turtle field with WRAP in action. The best answer is to use WINDOW whenever possible and remember that PU HOME will always return us to home without problems.

.SETNIB 165 sets a nib which draws the centre point of a circle and then interprets the next two moves to draw an arc. Look at figure 3a, which is the sequence of events for drawing a 1/6th circle arc using the commands:

```
CS FD 300 LT 120 FD 300
```

The home base is used as the circle centre. The first FD command sets the radius of the circle. The final two commands move the turtle to another point on the circumference of the circle and the arc between these last two points is

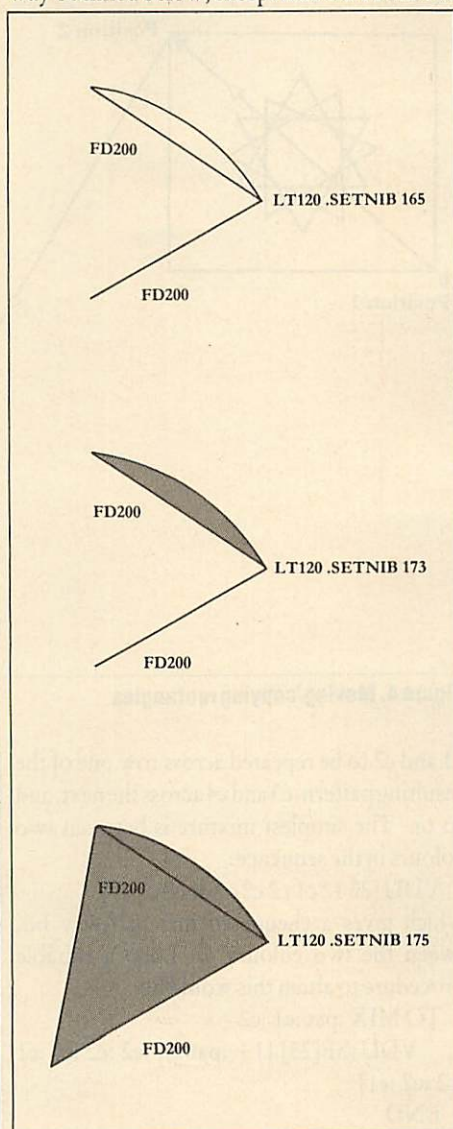
drawn. A semicircle could be drawn with the following command:

```
CS FD 300 BK 600
```

.SETNIB 173 is shown in figure 3b and it fills the area between the arc and its chord, operating in the same way as above. .SETNIB 181 behaves similarly, except that it fills the complete sector, as shown in figure 3c.

All the arcing nibs behave like the triangle nibs. If problems occur, try PU then move to the centre of the circle, and then run on the spot once or twice. This should remove any tendency for arcs to occur over the screen.

The turtle can copy and move its field – these facilities are some of the most complex available to the turtle. They both work in the way outlined below, except that .SETNIB 189



**Figure 3(a). Drawing an arc; (b) Filling a segment; (c) Filling a sector**

copies a rectangle and .SETNIB 191 cuts the rectangle out and moves it. Look at figure 4. The turtle must move to three points to copy or move a rectangle.

1. The bottom left corner of the area to be copied.

2. The top right corner of the area to be copied.

3. The bottom left corner of the recipient area.

Let's set a problem to explain this in more detail. Imagine that you wish to copy a complex shape from one side of the screen to the other – the shape is shown in figure 4 – and is drawn using the procedure POLY

```
TO POLY
```

```
  CS PU LT 90 FD 300 RT 90
```

```
  PD REPEAT 50 [FD 300 LT 145]
```

```
  PU HOME
```

```
END
```

```
TO COPY
```

```
  LT 90 FD 500
```

```
  RT 135 FD 450
```

```
  .SETNIB 191 SETPOS [0 -300] PU
```

```
END
```

POLY draws the shape and COPY copies it. The copy procedure must of course be matched to the location of the POLY shape. Inside the COPY procedure the commands behave as follows:

- LT 90 FD 500 moves to start of copy area.
- RT 135 FD 450 moves to other diagonal to record the copy.
- .SETNIB 191 sets the copying nib.
- SETPOS [0 -300] moves to the recipient area with the copy.
- PU protects the screen from more copies.

Simply by altering the .SETNIB 191 to 189 the area is moved rather than copied.

Of all the nibs available to the Logo user, nibs 197 and 205 may need most experimentation. The sequence of actions in drawing an ellipse is:

1. PU and move to the centre of the ellipse.
2. PU and move horizontally to the left-hand edge of the ellipse.
3. .SETNIB 197 and move either by SETPOS or LT/RT/FD to the X-Y co-ordinate of the highest point of the ellipse.

Typical ellipses might be:

```
CS LT FD 200 .SETNIB 197 SETPOS [200 200]
```

```
CS LT 90 FD 200 .SETNIB 197 SETPOS [0 200]
```

```
CS LT 90 FD 200 .SETNIB 197 SETPOS [-400 200]
```

The horizontal line in each case is deliberate but it can be removed by including a PU after the CS in each line. The ellipses can be filled simply by replacing the .SETNIB 197 with .SETNIB 205.

It is quite feasible to alter the palette of colours in any Logo mode, on any of the BBC series machines. The key is in the VDU 19 command. In mode 1, we have four logical colours 0 (black), 1 (red), 2 (yellow) and 3



## JOE'S JOTTINGS

(white), but we can perform a better mix of colours with black, red, green and blue. This means exchanging two colours. To do this type:

```
VDU[1922000000]
```

and

```
VDU[1936000000]
```

We could, of course, make a tool to do this task:

```
TO SETPAL :logical :actual
  VDU(SE[19]:logical :actual[000000])
END
```

This enables us to type:

```
SETPAL 2 2
```

or

```
SETPAL 3 6
```

Which brings us to the simplest of the colour

mixing facilities open to the Logo user with a GXR or Master. The VDU 23 command allows a number of colour-fill patterns to be mixed. We will concentrate on the four simple mixes, while the more complex ones will be covered in a later article. The VDU commands which control simple colour mixing are VDU [23 11 . . .] and VDU [23 (12/13/14/15) . . .]

VDU [23 11 000000] resets the four simple mixes to their default values. For mode 1 these are: mix 1 red-orange; mix 2 orange; mix 3 yellow-orange; mix 4 cream.

The actual mixing can be done using the next VDU commands. Mix 1 is created by issuing the command VDU [23 12 c1 c2 c3 c4 c5 c6 c7 c8] where the values of c1 to c8 are logical colours available. The approach is for

the following:

```
Mix 1 GCOL 16 0 Mix 2 GCOL 32 0
```

```
Mix 3 GCOL 48 0 Mix 4 GCOL 64 0
```

Of course, the GCOL command can do all the other GCOL things, and so is quite useful. Unfortunately just the sight of the turtle can turn off the mixtures because in being plotted on the screen, the turtle changes the value set by GCOL.

The way around this is to always use HT GCOL ... and only ST at the point where you have finished using the colour mix. Look at this procedure to mix purple and fill a square:

```
TOP.SQUARE define a square
SETPAL 2 4 change yellow to blue
MIX 4 1 2 mix purple from red and blue (call it mix 4)
```

### LOGO ON THE MASTER COMPACT



Joe Telford's crystal ball was well-polished when he wrote this article. Acorn has bundled the Logotron version of the Logo language with the new Master Compact.

The language comes on a 3.5in disc ready to run in the standard disc drive supplied with the Compact.

The software is loaded into the 'side-ways RAM' part of memory where it can be treated as if it were an actual ROM chip inside the machine.

Logotron's standard manual is supplied with the Compact, which details the commands in the language and gives sample listings for you to try.

Joe Telford wrote a wordprocessor with Logotron Logo in the January issue this year (page 77). His review of three versions of Logo for the BBC micro, including Logotron, was carried in the May 1985 issue (page 65).

Other articles of interest include a turtle graphics program in the February 1985 issue by Malcolm Banthorpe (page 158). This issue is sold out but photocopies of the eight pages cost £1.60 from Redwood Publishing at 141-143 Drury Lane, London WC2B 5TF (includes UK postage and packing, add £1 overseas).

In June, Joe Telford covered the Advanced Disc Filing System which is standard on the Master and the new Compact. This controls the way files are stored on disc. In February he looked at sideways RAM.

Back issues can be ordered using the form on page 129.

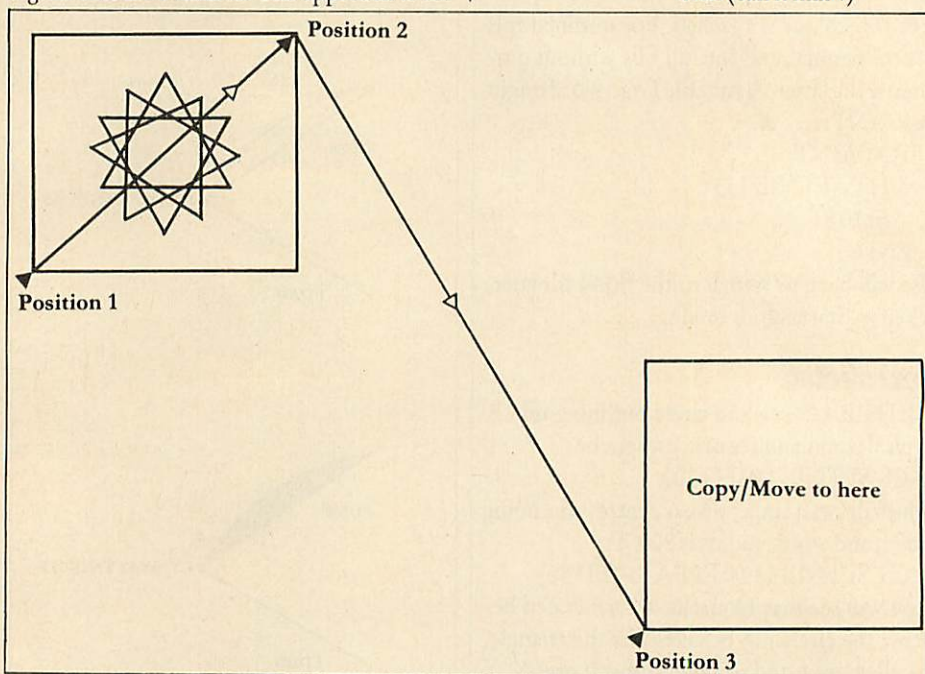


Figure 4. Moving/copying rectangles

c1 and c2 to be repeated across row one of the resulting pattern, c3 and c4 across the next, and so on. The simplest mixture is between two colours in the sequence:

```
VDU[23 12 c1 c2 c2 c1 c1 c2 c2 c1]
which gives a chequered mix half-way between the two colours. In Logo a suitable procedure to attain this would be:
```

```
TO MIX :pat :c1 :c2
  VDU (SE[23] 11+ :pat :c1 :c2 :c2 :c1 :c1 :c2 :c2 :c1)
END
```

Calling the colour mix is the most difficult part because Logo normally refers to the colour set in the turtle pen.

In fact we need to simulate the Basic GCOL command, and we do this with a procedure.

```
TO GCOL :mode :col
  VDU (SE[18] :mode :col)
END
```

To call the colour mixes 1 to 4 we simply type

```
LT 45 point along the diagonal
.SETNIB 101 use the square nib
HT GCOL 64 0 hide turtle and use purple ink
FD 280 do it:
END end definition
```

I'll conclude with a set of procedures for drawing a typical picture in modes 1 or 129. Rather than the usual four available colours, this picture mixes 11 different shades on the screen at once. The procedures show a mixture of .SETNIBS and mixes so that the items which we have discussed are demonstrated.

Provided we accept that the body geometry approach to Logo has much going for it, and we don't try to push children past that state too quickly, then the extended graphics facilities of the new range of BBC series micros can really supercharge our turtles.

*Turn to the index to yellow pages on page 113 for details of where to find Joe's listings.*



# reflex MAGNETICS

Now the Same High Quality  
but with Even More Choice

We ran the advertisement opposite and it certainly generated a lot of orders. We had a lot of people on the 'phone asking if we could supply slightly fewer disks, and as you can see, we're now offering quantities of 10's and 30's as well.

So now you can buy the same specification disks and we'll despatch the 10's and 30's in our unique Interlocking DiskBank filing system. For quantities of 50, we'll send them in a free lockable storage box.

Every disk carries a lifetime guarantee - if a disk is faulty send it back for two free replacements.

To order, just clip the coupon below.

We accept orders from all government bodies, schools, universities, PLC's etc. We despatch on receipt of an official purchase order.

If you've got a technical query ring 01-722 9727

If you're a credit card holder ring and place an immediate order on 01-722 9231.

Personal callers welcome.



Free  
Lockable  
box with  
50 disks

To Reflex Magnetic Ltd, Unit 2, 32 Lawn Road, London NW3 2XU.

Please rush me:

5 1/4" SSDD 48TPI	10 disks in a Diskbank box	_____ qty.	£12.80 each
	30 disks in a Diskbank box	_____ qty.	£36.40 each
	50 disks in a Lockable box	_____ qty.	£54.80 each
5 1/4" DSDD 48TPI	10 disks in a Diskbank box	_____ qty.	£15.80 each
	30 disks in a Diskbank box	_____ qty.	£49.80 each
	50 disks in a Lockable box	_____ qty.	£63.90 each
5 1/4" DSDD 96TPI	10 disks in a Diskbank box	_____ qty.	£18.10 each
	30 disks in a Diskbank box	_____ qty.	£51.10 each
	50 disks in a Lockable box	_____ qty.	£78.00 each
3 1/2" SSDD	10 disks in a Storage box	_____ qty.	£27.90 each
3 1/2" DSDD	10 disks in a Storage box	_____ qty.	£31.90 each

Prices include VAT and postage & packing.

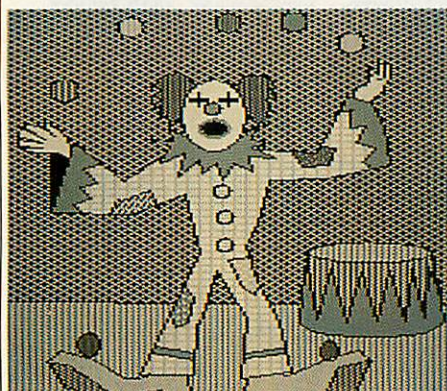
I enclose a cheque for \_\_\_\_\_  
or debit my Access/Visa card

number \_\_\_\_\_  
Signature \_\_\_\_\_  
Name \_\_\_\_\_  
Address \_\_\_\_\_

Postcode \_\_\_\_\_  
Telephone \_\_\_\_\_

MAGNETICS  
**reflex**  
DISKETTES DIRECT BY MAIL  
FROM THE MANUFACTURER





# ART TO ART CONVERSION

Transfer screens drawn with one art package to another – even if they use different modes – with this software to convert screens between modes 0, 1 and 2

**Phil Wilkes**

**T**here are many art and graphics programs available for the Acorn range of micros, each offering slightly different facilities. It is often helpful to use more than one to get the effects you require. Transferring a screen from one program to another is usually done by saving the screen from the first program and loading it into the second. This can be done because most art packages store pictures by simply saving that part of the micro's memory dedicated to the screen.

This technique cannot be used if the programs operate in different screen modes. Loading a picture created in one mode into another gives a jumbled image. 'Modecon' (listings 1 and 2 on the yellow pages) overcomes this by converting screens from one mode to another.

The following mode changes are covered:

Mode 1 to mode 0

Mode 2 to mode 0

Mode 2 to mode 1

These have been chosen because modes 0, 1 and 2 are the most frequently used in art packages. (This is because they allow the most detail or number of colours.) Only changes from lower to higher resolutions are included – moving the other way would mean losing considerable detail from the screen. In carrying out these mode changes, although the

resolution increases, the number of colours available always decreases. This can be compensated for by using the increased resolution to give different shading patterns to represent colours in the same way as a dot matrix printer dumping a colour graphics screen. In fact, changes to mode 0 can be used to check how a screen will look when printed in black and white, but very much faster than actually printing it out (and without wasting precious paper). The routines work on any type of graphics screen but are particularly effective when used with digitised pictures.

## How to use the programs

There are two listings to type in. Listing 1 sets up some machine code and some conversion tables which are then saved as "O.MODECON". Listing 2 is written in Basic and uses the saved routine to convert your own screens. The programs were written to run on a disc based machine. They can be used with tape, but make sure that PAGE is always set to &1900 when running the programs, otherwise you could be faced with the dreaded 'Bad program' message. (Do this by typing in PAGE=&1900 before you start.)

To use the programs, type in listing 1 and save it (this is always essential when dealing with machine code as an error could mean

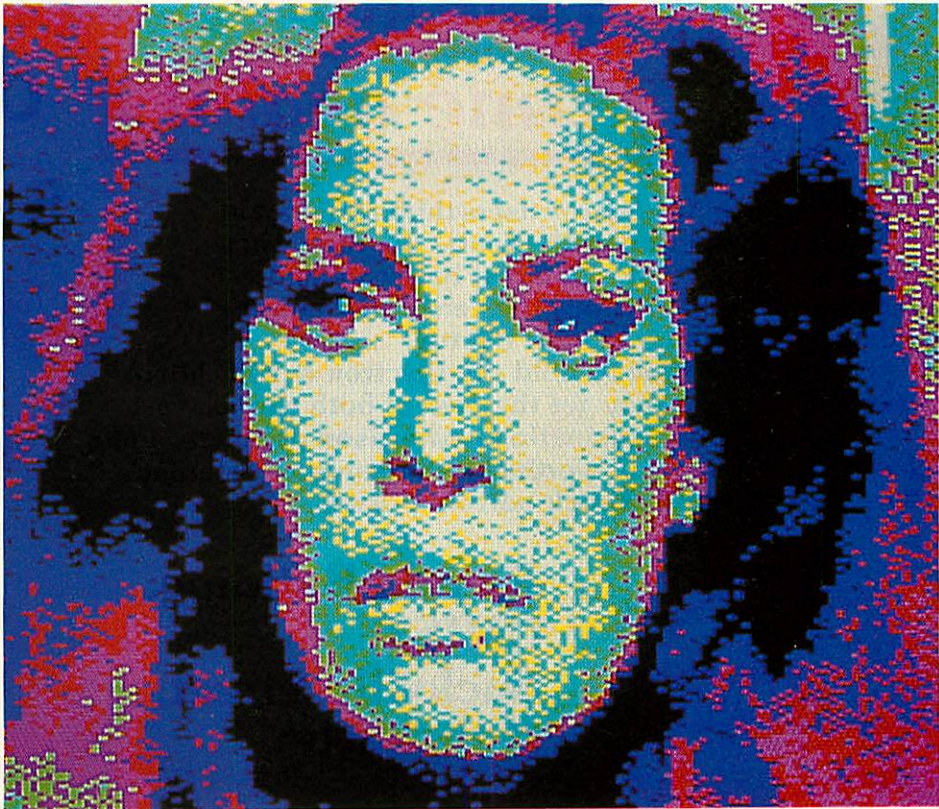
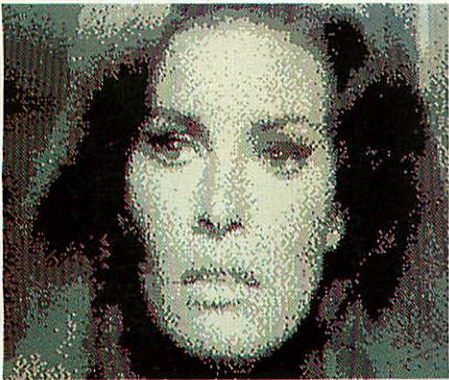
your program gets overwritten and you would have to type it in again). Notice that the routines for each mode conversion are independent, yet have many lines in common. Once the first is typed in, using the cursor and copy keys for common sections of code will save a lot of time.

When listing 1 is run, the conversion tables are compiled, the machine code assembled and the section of memory from &1500 to &18FF containing both is saved as "O.MODECON". The program gives a suitable output to keep you informed of progress but requires no input from the user. This program should only need to be run once.

Listing 2 loads "O.MODECON" and provides easy access to the conversion routines. It first sets variables to each of the three machine code entry points. Prompts are then given for the initial mode and screen name (which will have been saved previously from another program), and also for the final mode and screen name.

Don't choose the same name, or the original screen will be overwritten (unless discs are changed while the program is running, that is). I find it useful to include the mode in the file name, eg, P.1PIC will be a mode 1 picture. I also keep pictures in the P directory on discs to avoid confusion with other types of file. This





**Y**ou can see the same clown screen (opposite page) in (l to r) mode 0, mode 1, and mode 2. The Raquel Welch screen (above) was converted using Phil's software. Clockwise from top l: mode 0, mode 2 and mode 1

file name convention is also used by several art packages.

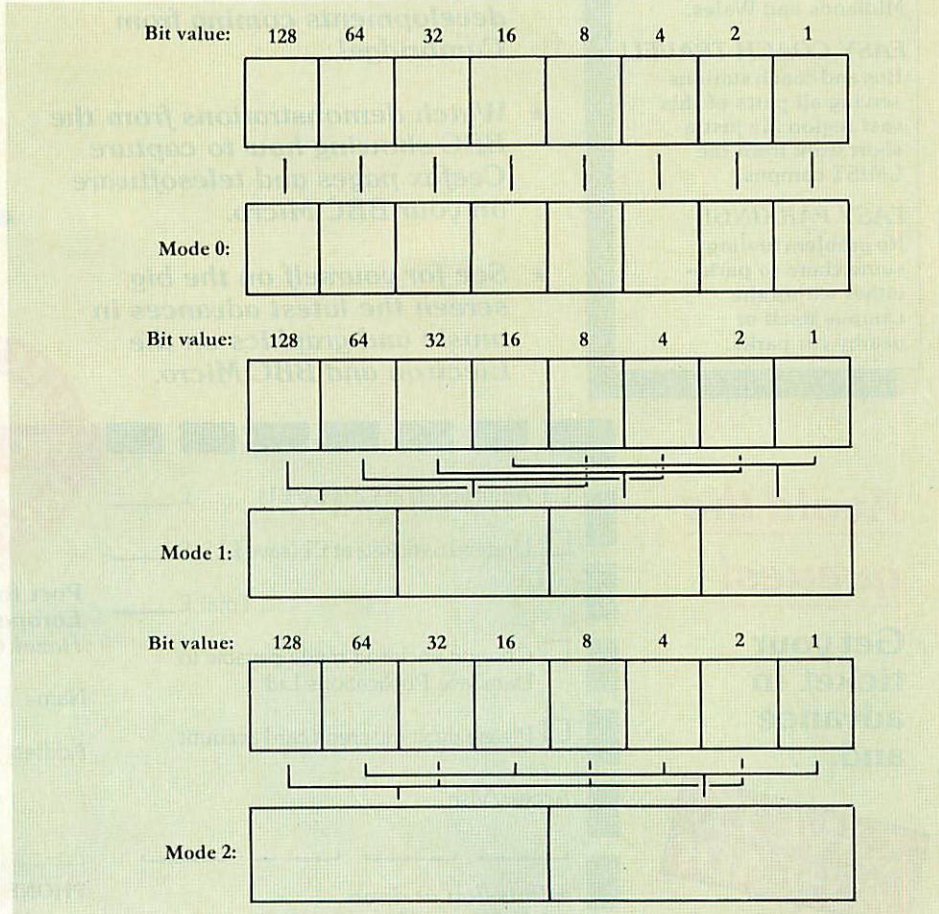
The screen mode is then set to the final mode and the picture loaded into the screen memory. The picture will be recognisable but will be covered in vertical stripes at this stage. Once the screen has loaded, the appropriate mode conversion routine is called and the screen is changed to the new mode in less than a second. The computer will now beep and wait for any key to be pressed. This allows discs (or tapes) to be changed before finally saving the picture. Once saved, the new screen can be used in any program which used the final mode.

**How the programs work**

There is no need to understand how the routines work in order to use them. However, for those interested, the remainder of this article gives some of the theory behind them.

The mode conversion routines use the fact that screen memory is arranged in an identical manner for modes 0, 1 and 2. The difference lies in how each byte of screen memory is decoded to give the display (figure 1).

Any one byte can only hold a maximum of 256 different values (0 to 255). If we work out for each value how this appears in one mode, and then how each colour is to be represented in the new mode, we can construct a simple



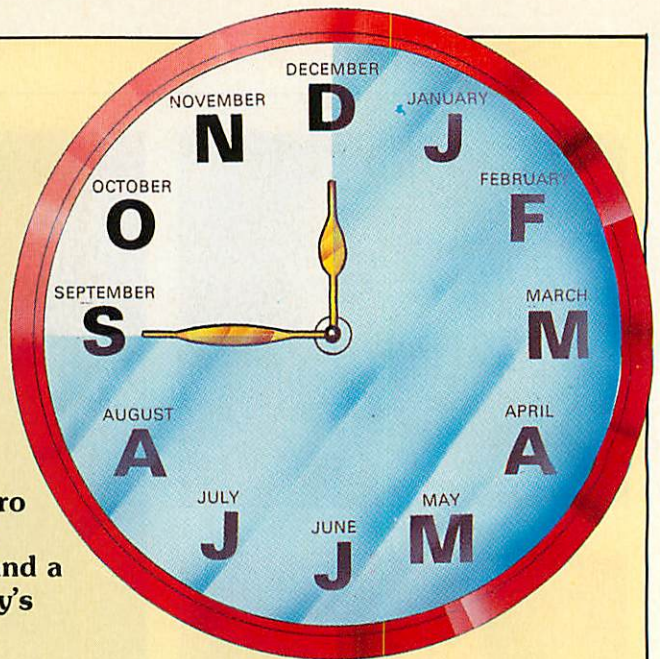
**Figure 1. How each byte of screen memory is decoded to give the display in different modes**



# Yes – it's bargain-hunting time again!

For BBC Micro and Electron users this is the start of the top buying period of the year – the time when they stock up with all the latest hardware and software that will enhance the versatility, power – and just sheer fun! – of their micros.

And the ideal time to hold the Electron & BBC Micro User Show, where they get the best of both worlds – a first look at all the fascinating new-season products, and a chance to pick up really worthwhile bargains as yesterday's top sellers are sold at rock-bottom prices!



## EASY RAIL TRAVEL!

300 yards from Piccadilly railway station, with speedy connections from all parts of the North, Midlands and Wales.

## EASY COACH TRAVEL!

Bus and coach stations serving all parts of this vast region are just a short walk from the UMIST campus.

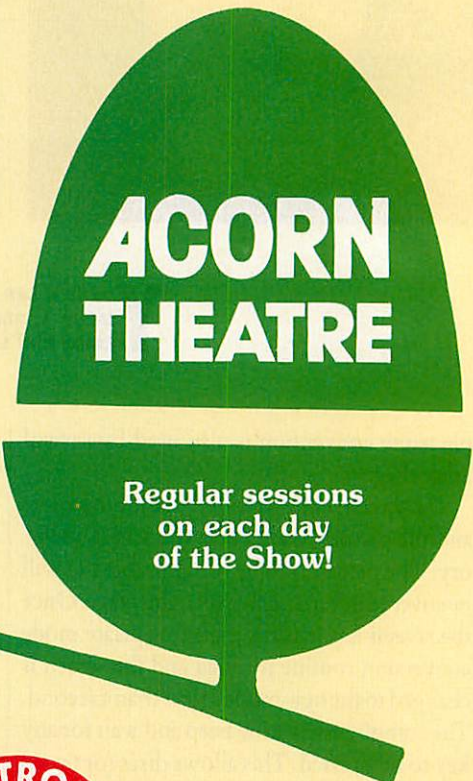
## EASY PARKING!

No problem finding somewhere to park – either within the campus itself or nearby car parks.

**Renold Building,  
UMIST,  
Sackville Street,  
Manchester**

10am-6pm Friday, September 26  
10am-6pm Saturday, September 27  
10am-4pm Sunday, September 28

- ★ *Listen to Acorn experts talking about all the exciting new developments coming from Cambridge!*
- ★ *Watch demonstrations from the BBC showing how to capture Ceefax pages and telesoftware on your BBC Micro.*
- ★ *See for yourself on the big screen the latest advances in music and graphics on the Electron and BBC Micro.*



**Avoid the  
queues!**

**Get your  
ticket in  
advance  
and...**

**SAVE £1  
A HEAD!**

☐ Adult tickets at £2 (save £1) ..... £ \_\_\_\_\_

☐ Under-16s tickets at £1 (save £1) £ \_\_\_\_\_

Total £ \_\_\_\_\_

☐ Cheque enclosed made payable to  
Database Publications Ltd.

☐ Please debit my credit card account

Access/Visa

**Admission at door:**  
**£3 (adults), £2 (under 16s)**



**Advance  
ticket order**

**Post to: Show Tickets,  
Europa House, 68 Chester Road,  
Hazel Grove, Stockport SK7 5NY.**

Name .....

Address .....

..... Signed .....

**PHONE ORDERS: Ring Show Hotline: 061-456 8835**

*Please quote credit card number and full address + Ref AU9*



table for each possible value to perform the mode conversion.

This is precisely what 'Modecon' does. It actually uses two tables for each value which are used alternately to give better dot patterns to represent the colours. As each byte translates into only one byte, the tables are stored as consecutive bytes in memory (a byte array) rather than use integer arrays which would waste memory.

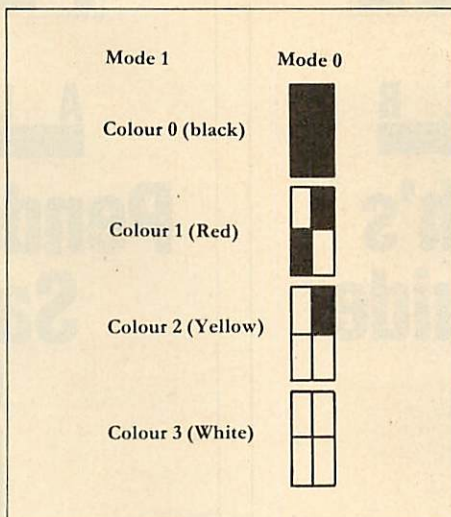
The machine code program simply looks at the value in every byte of screen memory, looks up this value in the byte arrays and replaces the old with the new value.

With conversions from mode 2, flashing colours are treated in exactly the same way as the corresponding steady colour. This means that the top two bits of each byte can be ignored, making each table just 64 bytes in length compared to the full 256 for the mode 1 to mode 0 conversion.

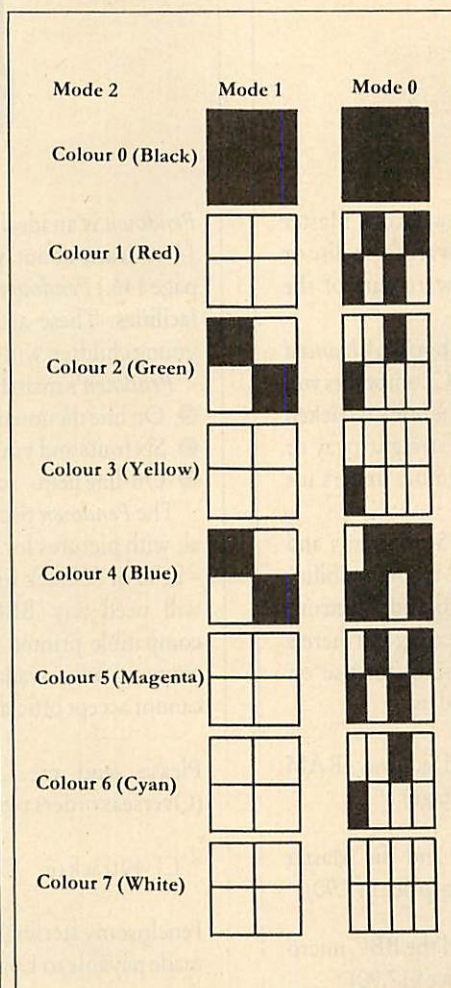
To set up the tables, it is not necessary to consider all 256 (or 64) values individually. We can let the computer do some of the work for us. All we need to do is decide how each colour in the first mode is to be represented in the second mode, and then analyse each byte value to see what this represents in terms of colours on the screen. Each colour is converted to the number necessary to give the chosen pattern in the new mode. The resultant numbers are then combined to give the full conversion value. Examination of the table set-up routines in listing 1 should make this clear.

Figure 2 illustrates the different dot patterns used in each of the conversions. Conversions to mode 0 just reflect the brightness of the colour in the original mode giving a grey scaled picture. Converting from mode 2 to mode 1, I have tried not only to reflect the brightness but to approximate some of the colours as well. This effect is sometimes helped by changing logical colour 2 in mode 1 to cyan using VDU 19,2,6;0;. This is not always helpful - if in doubt, try it and see.

The routines will work as they stand with both shadow screen memory and the 6502 second processor, but with one important difference. As the memory which is being accessed does not now represent the screen (but is parallel to it), you cannot see the changes as they happen. This will not normally be a problem as it will usually be the final converted screen which is required rather than seeing the routines as they happen. It is always possible to switch off the shadow memory or second processor if you would like to monitor the program's progress - there is no advantage in having the extra memory present. Once a picture has been converted, it can of course be used with any software which can use these



**Figure 2(a). Dot patterns converting from mode 1 to mode 0**



**Figure 2(b). Dot patterns converting from mode 2 to modes 1 and 0**

extra pieces of hardware.

Alternatively, you may like to amend the program using indirect methods of accessing the screen memory, such as using OSWORD 5 and OSWORD 6 to read and write respectively from the 6502 second processor. The method used for shadow memory will depend on the make of your shadow board and the software support available for it.

As an added extra, I have included an entry

point in the code to convert mode 5 to mode 4 (CH54). While this probably isn't as useful as the other routines, the conversion table necessary is identical to the mode 1 to mode 0 conversion and its inclusion required only a few extra bytes. The only change is that the start address is greater to allow for 10k screens rather than 20k.

Converting between screens of differing lengths (eg, from mode 4 to mode 1) requires a slightly different technique and I will cover this in a future article.

## ADFS

The mode conversion will run on a Master 128 or Master Compact under ADFS. It will not run as shown on a BBC B/BBC B+ or Electron with Plus 3, all of which raise Page to &1D00 when running ADFS.

The programs can be modified to run so that the machine code programme CONVERT is assembled above this address. Assembling the program at &1500 will make it overwrite the ADFS catalogue and variable/pointer space which will result in the micro hanging up. To ensure this does not happen make the following changes to the two programs:

## MODECON

```
65 HIMEM=&2C00
140 even10%=&2D00
150 even20%=&2F00
160 even21%=&2F80
170 odd10%=&2E00
180 odd20%=&2F40
190 odd21%=&2FC0
780 P%=&2C00
1520 FOR i%=&2C00 TO P%-1
1550 IF total%<>14839 PRINT "check-
sum error in assembler.":VDU7:END
1570 FOR i%=&2D00 TO &2FFF
1640 *SAVE "CONVERT" 2D00 3000
```

## DEMO

```
70 MODE 2:HIMEM=&2C00
100 MODE 1:HIMEM=&2C00
140 MODE 0:HIMEM=&2C00
210 ch10%=&2C00
220 ch20%=&2C24
230 ch21%=&2C4C
```

The conversion program now loads in at &2C00, so ensure that any programs you may use in future which utilise CONVERT first set HIMEM to &2C00 to prevent the machine code being corrupted.

*Phil Wilkes used his Artist program, presented in the August issue, to create all these pictures, which are featured on the Acorn User Gallery Disc (see page 111).*

*Phil Wilkes' listings are on the yellow pages. See the index to yellow pages on page 113.*







# SPIDER POWER

What's spider power? Well, you can plot just about any equation so that you can explore the behaviour of mathematical functions with the Spider curve-plotting program

David Johnson-Davies and David Deutsch

Curve-plotting programs provide an excellent way of exploring the behaviour of mathematical functions, and produce especially spectacular results on computers with high-resolution graphics displays, such as the BBC micro. Several such programs have appeared in *Acorn User*, so why present another?

Simpler curve-plotters have three main drawbacks: first, they cannot plot some of the most interesting equations, such as  $X^2Y = Y^2X$ , which have  $X$  and  $Y$  on both sides of the equals sign. Such curves often require more than one  $Y$  value to be plotted for each value of  $X$ . Second, they do not deal with equations containing expressions such as  $1/X$  or  $\text{LN}(\text{SIN}(X))$  which cannot be evaluated at certain points. Third, they do not allow functions to be given in polar co-ordinates. The *Spider* curve-plotter overcomes all of these drawbacks. Equations can be expressed in any convenient form, with arbitrary expressions involving  $X$  and  $Y$ , or the polar co-ordinates  $r$  and  $t$ , or even mixtures of all four of them, on both sides of the equals sign.

For speed, the program evaluates the function at as few points as possible in the plane. As soon as it has found a branch of the curve, it crawls along the curve, plotting as it goes, like a spider weaving a web – hence its name. Once one branch of the curve has been fully plotted, it searches for and plots any other branches.

The sample plots in figures 1 to 3 give examples of curves plotted by the *Spider* that would cause the three types of problems listed above for other programs.

The curves in figure 1 are plotted from functions that cannot be put into the standard form, ' $Y = \text{a single-valued function of } X$ '. Figure 1(a) shows a plot of the curve:

$$X^2Y = Y^2X$$

Figure 1(b) shows another interesting curve:

$$Y^2 = X^4 - X^6$$

which has a dumb-bell shape. Finally, figure 1(c) shows how two sine-waves  $Y = \text{SIN}(X)$  and  $X = \text{SIN}(Y)$  are superimposed in the function  $(Y - \text{SIN}(X)) * (X + \text{SIN}(Y)) = 0$

This illustrates a general method of deriving

the equation of superimposed curves. The functions plotted in figure 2 are all 'badly behaved' equations. Figure 2(a) shows:

$$Y = \text{TAN}(X)$$

which becomes infinite when  $X = \text{PI}/2, 3\text{PI}/2$ , etc. Figure 2(b) gives a plot of:

$$Y = \text{LN}(\text{SIN}(X^2))$$

which cannot be evaluated for values of  $X$  where  $\text{SIN}(X^2)$  is negative.

The third set of plots, in figure 3, shows curves expressed in polar co-ordinates, where each point is specified by its distance from the origin, and the angle  $t$  made by the line joining it to the origin (the program uses  $t$  as a shorthand for the more usual Greek letter 'theta'). In polar co-ordinates a spiral can be described very simply by the equation:

$$r = t$$

as plotted in figure 3(a). 3(b) shows a spiral with a superimposed ripple, with equation:

$$r = t + 1 - \text{COS}(10*t)$$

Finally, figure 3(c) plots:

$$r = t + X/2$$

illustrating that polar co-ordinates can be mixed with cartesian co-ordinates in the same equation. These examples give some idea of the range of functions that can be explored with the *Spider*; some other more complicated functions will be described later.

## Functions and curves

A general function of  $X$  and  $Y$ ,  $Z = \text{FNA}(X,Y)$ , describes a surface in three dimensions. For every point  $(X,Y)$  on the surface, the function  $\text{FNA}(X,Y)$  gives the height  $Z$  of the surface. The function is said to have a 'zero' whenever the height is zero.

If you think of the surface as a range of mountains partially submerged in water, then the 'zeros' occur where the mountains meet the water. The shape of the water-line (viewed from above) is the curve in two-dimensions given by  $\text{FNA}(X,Y) = 0$ .

For example, consider the surface whose height at any point  $(X,Y)$  is:

$$Z = 1 - X^2 - Y^2$$

This defines a surface like a mountain peak, standing one unit above the water-line. The

water-line at  $Z = 0$  describes the curve:

$$1 - X^2 - Y^2 = 0$$

which can be rearranged as the more familiar:

$$X^2 + Y^2 = 1$$

This is, of course, a circle with a radius of 1 and this is the form in which you would give the function to the *Spider* program.

The program works as follows. The *Spider* crawls over the surface, using a mathematical technique called 'Newton's method' to locate the water-line. It then crawls along the water-line to plot the curve. If it meets part of the curve that it has already plotted, it jumps to another place on the surface, and starts again looking for another branch of the curve.

The program can optionally plot red dots to show the points on the plane that the *Spider* is visiting in its search for a branch of the curve. The patterns made by these dots show the behaviour of 'Newton's method' used to locate the curve's branches.

## Solving equations

Before describing the full *Spider* program, which solves equations in two variables, we will illustrate how it works by showing how a computer can solve an equation containing just one unknown variable. Solving an equation for  $X$  means finding a value of  $X$  for which the equation is satisfied. For example:

$$2 * X = X + 3$$

is satisfied for the value  $X = 3$ , because  $2 * 3 = 3 + 3$ , so  $X = 3$  is the equation's solution.

The first problem is how to allow the user to type in an equation which can be evaluated for different values of  $X$ . Solving the equation 'function of  $X = \text{another function of } X$ ' is equivalent to finding a value of  $X$  for which:  $(\text{function of } X) - (\text{another function of } X) = 0$ . The solution is to use *EVAL* on a version of the equation with '=' replaced by '-'. This program reads an equation into *g\$* and puts a version into *f\$* which can be used with *EVAL*:

```
10 INPUT g$
20 E% = INSTR(g$, "=")
30 f$ = "(" + LEFT$(g$, E% - 1) + "-" +
  (" + MID$(g$, E% + 1) + ")"
40 PRINT f$
```



# NEW BBC PRODUCTS FROM CLARES

## FONTWISE PLUS £20.00

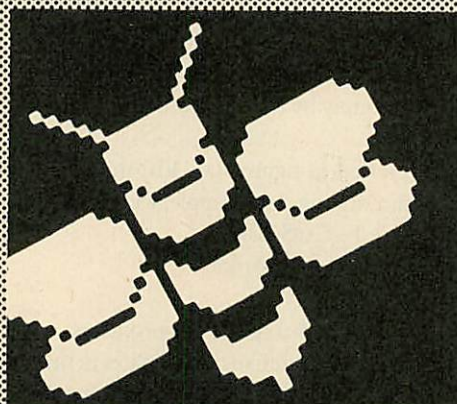


FONTWISE PLUS is now compatible with VIEW, MINI OFFICE II, EDWORD 2 and INTERWORD as well as WORDWISE and WORDWISE+!

Now you can have PROPORTIONAL and JUSTIFIED text in 12 different fonts, all within the same document if required. In addition to the standard facilities like line and page length, pagination, left margin etc. we have now added

- Enlarged, standard & condensed fonts
- Tabs
- Temporary indent
- User definable line feed
- User definable character spacing
- Non proportional fonts
- Now with 12 fonts
- Plus many more features

If you are not convinced ask us to send you a sample printout and you will be amazed at the quality - requires an EPSON compatible printer capable of single, double and quad density graphics but you do not require any RAM in your printer to use FONTWISE PLUS.



## MACROM £40 £35 DISC



MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
- Tokenized source code
- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.

**Ask for a data sheet today**

*Enhanced*

## BETA-BASE £25



### SPECIFICATION

- |                  |  |
|------------------|--|
| 1) Random Access | - disc based, single or dual drives      |
| 2) File Size     | - max 65,000 records                     |
| 3) Record Size   | - up to 2048 characters and 200 fields   |
| 4) Field Size    | - up to 254 characters                   |
| 5) Holds         | - approx 1200 ADDRESS records per 100k   |
| 6) Search        | - 5 search fields using powerful options |
| 7) Sort          | - 500 records on 3 fields in 60 seconds. |

### SYSTEM FEATURES

- \*CALCULATE - using any valid expression
- \*PRINTOUT - Powerful options
- \*REDEFINE - Titles, fields etc.
- \*TRANSFER - From one file to another
- \*GLOBAL ENTRY - of repetitive data
- \*SEARCH LISTS - Allow creation of sub Databases within main Database
- \*SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
- \*INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure

## BETA-BASE UTILITIES £12.00



Extend the power of Beta-Base with the extra facilities provided on this disc.

- \*MAIL MERGE
- \*LABEL PRINTER
- \*DISC SORT
- \*EXTENDED SEARCH
- \*FREE FORMAT TRANSFER
- \*FAST PACK
- \*STATUS

The MAIL MERGE alone is worth £12 so you get a real bargain with this disc. The features are so numerous that we cannot mention them all here.

Ask for our UTILITIES DATA SHEET if you want more information.



DISC

40

40 TRACK

80

80 TRACK

3

3" DISC - ADD £3



EPROM

Send for detailed newsletter.

All prices inclusive of VAT & Carriage - NO EXTRAS! Please state 40 or 80 track disc and state D.F.S. you use.

## RAMROD £40 ROM



## £35 DISC



RAMROD is the ultimate in toolkit ROMs and is fully compatible with the whole BBC range from Model B through to the MASTER 128 and including both 6502 and TURBO co-processors. RAMROD adds 54 new commands to your computer. Areas covered are DISC (DFS & ADFS), GENERAL (memory commands etc.), ROM (including sideways RAM) and TUBE.

RAMROD provides commands to dump memory or a disassembly of memory to a printer. Editors can display the screen in 40 or 80 column mode.

### DISC

Edit discs and search for ASCII or HEX sequences.

### GENERAL

Edit, search, disassemble, compare, dump to printer and relocate ANY area of memory including the SHADOW screen. List vectors in use, load and save function keys even on MASTER etc.

In addition to the above you can move between ROM/RAM banks using (CTRL) Cursor Keys when in either memory or disassembly mode PLUS you can switch between memory editor and disassembler by pressing (CTRL)(TAB).

### ROM

Includes commands for listing, loading, saving, wiping, swapping, ROM images. PLUS formatting and titling RAM banks for the ROM filing system and saving programs in RFS format.

### TUBE

Provides the same memory commands as GENERAL plus SHIFT and COMPARE memory across the TUBE both ways.

We cannot do justice to RAMROD in the space here so please ask us to send you a fuller data sheet - RING NOW!

### NEW PRODUCTS

Watch out for a fabulous new product which will be released during SEPTEMBER for the MASTER and its compatibles.

This is a high quality art package called ARTROOM but it offers many features not provided elsewhere. It is a full screen package and is written by the authors of FLEET STREET EDITOR so you know that it will be good.

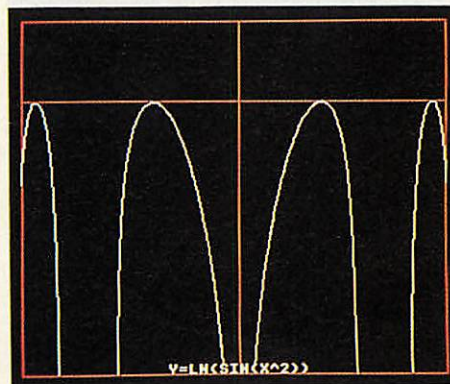
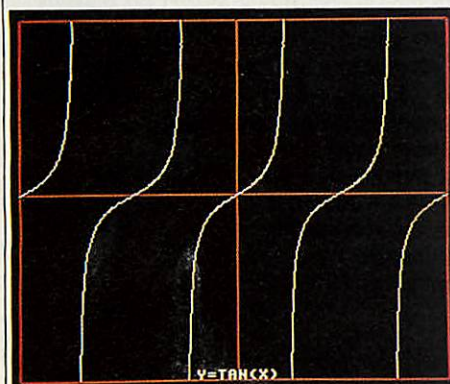
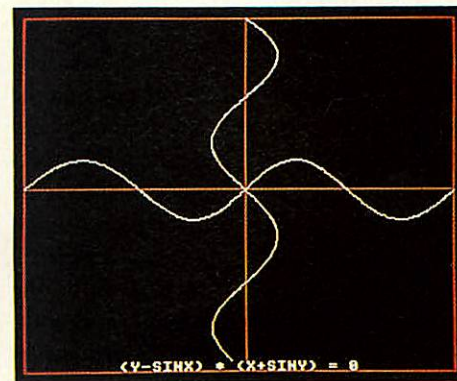
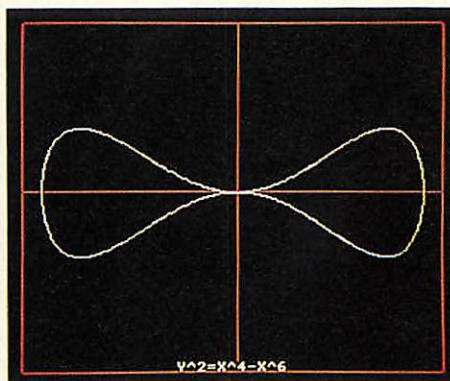
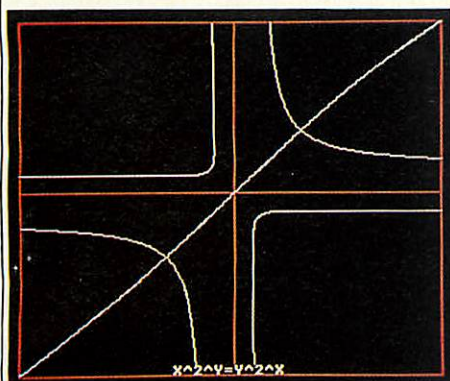
Ask for a data sheet NOW!

**clares**

MICRO SUPPLIES

DEPT AU  
98 Middlewich Rd.,  
Northwich, Cheshire CW9 7DA.  
Tel: 0606 48511  
Open 9-5pm Monday-Friday  
LUNCH 12.30-1.30





**Figure 1. (Top row, left to right)**  
Plots from functions that cannot be put into form 'Y = function of X'.

- (a).  $X^2 \cdot Y = Y^2 \cdot X$ .
- (b).  $X^2 = X^4 - X^6$ .
- (c).  $Y = \sin(X)$  and  $X = \sin(Y)$  superimposed in  $(Y - \sin(X)) \cdot (X + \sin(Y)) = 0$

**Figure 2. (Bottom, left to right).**

- (a).  $Y = \tan(X)$
- (b).  $Y = \ln(\sin(X^2))$

This converts:

$$2 \cdot X = X + 3 \text{ into: } (2 \cdot X) - (X + 3)$$

Incidentally, the extra brackets are inserted to avoid problems with equations such as:

$$X = 1 - X$$

Now we want to find a value of X such that EVAL(f\$) is zero.

## Newton's method

Listing 1 on the yellow pages shows a program which uses EVAL to solve an equation which the user types in. The program uses a variant of a method attributed to Sir Isaac Newton (but probably not invented by him). It works by starting with an initial 'estimate', v, of the solution, (which, in most cases, need not be anywhere near an actual solution), and then successively improves it until the desired accuracy is reached.

The function is evaluated at the points where  $X = v - a$  and where  $X = v + a$ . The curve of the function is then approximated near  $X = v$  by a straight line through these two points. Then the value of X where the straight line crosses the X axis is taken as an approximation, often a surprisingly good one, to the value where the function is zero, which is the solution we want.

The value of 'a' is chosen as less than the accuracy we want, called 'accuracy' in the program, for a good reason. For certain functions, such as:

$$X \cdot X = 0$$

the line joining two points on each side of the curve actually crosses the X axis further away from the solution ( $X = 0$ ) than the original two

points. We choose these points closer to the solution than the finally desired accuracy to ensure that the program will, for reasonable functions, eventually reach the criterion.

Try it with a few equations. For example, you could try the equation:

$$X = \cos(X)$$

with the estimated solution  $X = 1$  and 'accuracy'  $1E-7$ . The program prints:

Equation to solve for X:  $X = \cos(X)$

Estimated solution:  $X = 1$

Desired accuracy in  $X = 1E-7$

Solution found near  $X = 0.739085133$

The NEWT program uses ON ERROR GOTO to trap errors that might occur during evaluation of the user's equation. Otherwise, when given an equation such as  $\text{SQR}(1 - X^2) = 0$  which has the perfectly good solution  $X = 1$ , the program would fail, because right next to the solution ( $X = 1$  or  $X = -1$ ) there are values of X which cause an error when the program tries to EVAL the function  $(\text{SQR}(1 - X \cdot X)) - (0)$ . For example, if  $X = 1.01$ , the value of  $1 - X \cdot X$  is negative,  $-0.0201$ , and the square root of a negative number does not exist. The program would generate an error as soon as one of its successive estimates of the solution X happens to be larger than 1.

Instead of halting when the program encounters an 'error' it can take remedial action, specified by you, and then continue normally. In your program, if EVAL fails for a new estimate of X, the error handler (lines 320-370) is invoked and X is set to a value half-way between the old and the new value, in the hope

that the function can be evaluated there. If not, the error handler will be invoked again and X will be set still nearer to the old value.

On the BBC micro, any 'error', even one that is intercepted by ON ERROR GOTO, clears the 'RETURN' stack, so that all subroutine return addresses are lost. This means that if the error occurred inside a procedure (whether called as a PROC or FN or by a GOSUB), the program would fail to return to the calling location when the procedure ended. This is the reason why we have to 'simulate' the subroutine call on line 140 by using a GOTO statement.

## Curve drawing

The 'Newton's method' way of solving equations is based on the fact that if  $f(x)$  is a function of x, and  $x = v$  is an approximate solution of the equation  $f(x) = 0$ , then if a is a small number:

$$v - a \cdot \left[ \frac{f(v+a) + f(v-a)}{f(v+a) - f(v-a)} \right]$$

is usually a much better approximation to the solution than v was.

Drawing a curve in two dimensions is equivalent to finding all the solutions of an equation in two variables:

$$f(x,y) = 0$$

The curve drawing program, *Spider*, shown in listing 2 on the yellow pages, uses a two-variable Newton's method to find any one point on the curve, and then moves along the curve in short straight-line jumps, correcting itself with Newton's method after each jump.



# GRAPHICS

## Program operation

The key to the program's operation is the way that it tests for a zero at a given point on the curve. At first sight it might seem sufficient simply to evaluate the function at that point and see if it is less than some very small value such as  $1E-7$ . However, this is not good enough, since the function may get very small without actually passing through zero. The solution is to evaluate the function at an additional four points around the central point:

$$\begin{array}{c} (x,y+dy) \\ \uparrow \\ (x-dx,y) \leftarrow (x,y) \rightarrow (x+dx,y) \\ \downarrow \\ (x,y-dy) \end{array}$$

A zero has been found if at least one of the five values is on the other side of zero from the others (line 1040).

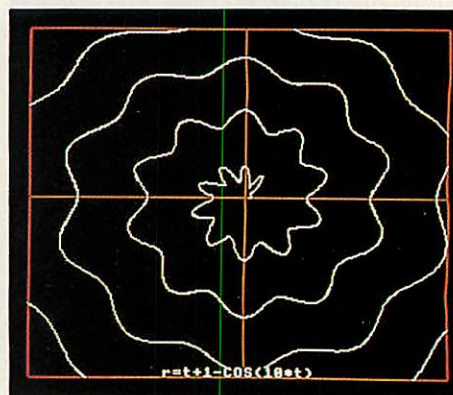
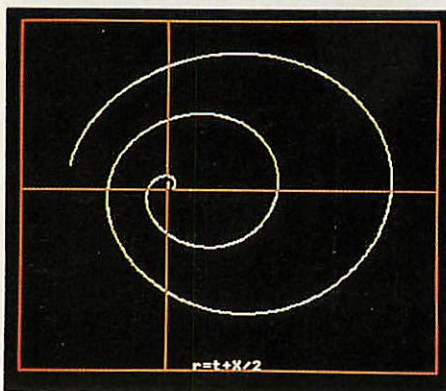
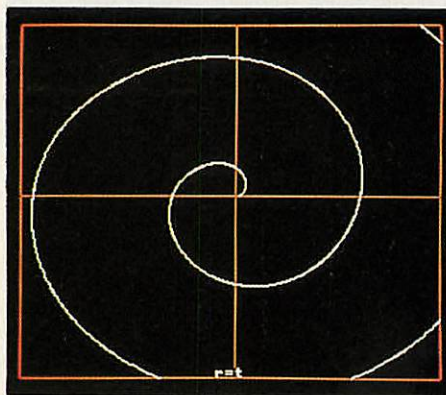
A second test is needed to detect the rarer case of the surface just touching zero, rather than passing through it. In this case the condition is that the central point should be a factor of 100 smaller than the sum of the sizes of the outer points (line 1050).

The rest of the program works as follows. First, the program prompts for the equation to be plotted (lines 110 to 170). As in the NEWT program, the equation in g\$ is converted to an expression in f\$ which can be EVALed (lines 180-190). Then the program prompts for the range of values over which the equation is to be plotted (lines 210 to 290). The screen will eventually show a picture of the curve for all values of X between xl and xr, and for all values of Y between yl and yu. These four variables define the 'window' through which we shall see the curve. The program allows strings to be typed for these four parameters, and uses EVAL so that the values can be entered as an equation, such as  $\text{SIN}(\text{PI}/3)$ .

The program then calculates the co-ordinates (xa,ya) at which axes will be drawn; this is at the origin (0,0), or (xl,yl) if the origin is not within the window.

The program checks for the presence of either of the polar co-ordinates, r or t, and sets the logical variables any\_r and any\_t accordingly. If t is specified, the program prompts for the range of values for t over which the equation should be evaluated. Each  $2\pi$  range corresponds to one full rotation around the plane; successive planes are plotted in sequence, counted by the variable 'sheet', which counts from 1 to hisheet (lines 380-440). Alternate sheets are plotted in two different logical colours, to avoid gaps at the overlap between sheets.

To save time when drawing the curve (for complicated functions in polar co-ordinates the program can be a little slow) it is drawn in



**Figure 3.** Shows plots of curves expressed in polar co-ordinates. 3(a) (above left). Plots a spiral described by the equation  $r=t$ . 3(b) (above right). Shows a spiral with a superimposed ripple, with equation  $r=t+1-\text{COS}(10*t)$ . 3(c) (left). Plots an equation which mixes polar co-ordinates and cartesian co-ordinates;  $r=t+X/2$

small straight-line segments, rather than pixel-by-pixel. The variable 'arc' holds the approximate number of pixels in each straight-line segment. For faster plotting, at the cost of less smooth curves, alter arc to 5 in line 480.

For similar reasons to those of NEWT, this program relies on 'ON ERROR GOTO' statements to keep the program going if it reaches values of X and Y where the function defining the curve is badly behaved (eg, tries to take the square root or logarithm of a negative number, or to divide by zero).

Because SPIDER calls these 'subroutines' from different places in the main program, the problem is slightly more serious than in NEWT, and a means is needed to return control to the correct point. Where a conventional program might have a procedure FNCloser that is called from two different places:

```
500 a = FNCloser(x1,y1)
510 REM next statement
.....
600 b = FNCloser(x2,y2)
610 REM next statement
.....
800 DEF FNCloser(x,y)
810 REM result in 'result'
.....
890 = result
```

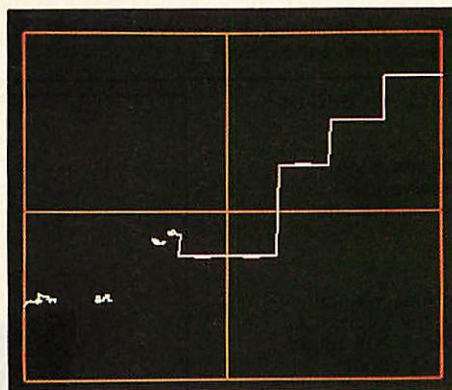
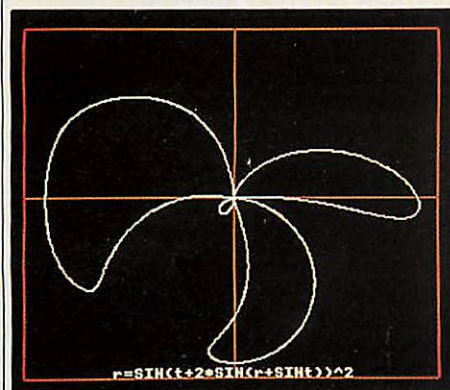
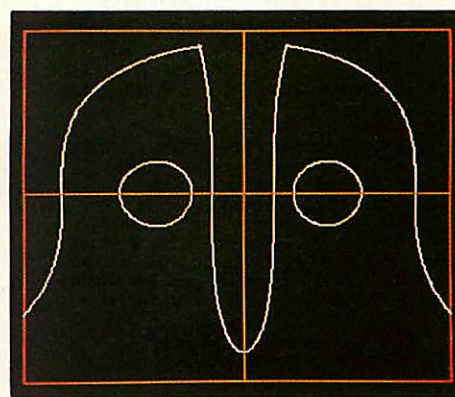
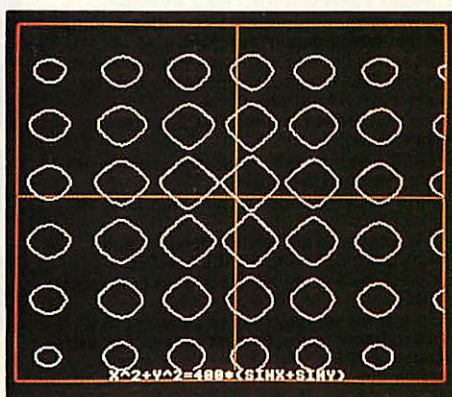
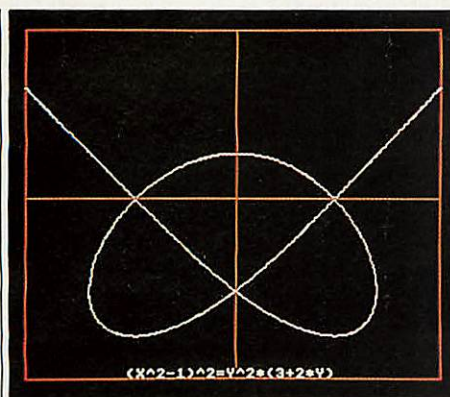
We avoid the use of functions, procedures or GOSUBs, by using a GOTO to call the routine. Before calling it a variable closer\_ret, is set to a code number to indicate where control should be returned.

From the routine an ON...GOTO then returns to the correct line, with the result passed in a variable called result:

Figure	Equation	x	y	t
1 (a)	$X^2 \cdot Y = Y^2 \cdot X$	-8	8	-8
1 (b)	$Y^2 = X^4 - X^6$	-1.1	1.1	-1.1
1 (c)	$(Y - \text{SIN} X) \cdot (X + \text{SIN} Y) = 0$	$-2\pi$	$2\pi$	$-2\pi$
2 (a)	$Y = \text{TAN}(X)$	$-2\pi$	$2\pi$	-10
2 (b)	$Y = \text{LN}(\text{SIN}(X^2))$	-3	3	-3
3 (a)	$r = t$	-10	10	-10
3 (b)	$r = t + 1 - \text{COS}(10 \cdot t)$	-20	20	-20
3 (c)	$r = t + X/2$	-15	30	-20
4 (a)	$(X^2 - 1)^2 = Y^2 \cdot (3 + 2 \cdot Y)$	-2	2	-2
4 (b)	$X^2 + Y^2 = 400 \cdot (\text{SIN} X + \text{SIN} Y)$	-20	20	-20
4 (c)	$(X^2 + Y^2 - 1) \cdot (\text{ABS}(\text{ABS} X - .5))^2 + Y^2 - .04 \cdot (X^2 \cdot 30 - Y^3 - 1) = 0$	-1.2	1.2	-1.2
4 (d)	$r = \text{SIN}(t + 2 \cdot \text{SIN}(r + \text{SIN} t))^2$	-1.1	1.1	-1.1
4 (e)	?	-4	4	-4

**Table 1.** The parameters used to plot the curves in figures 1 to 4





**Figure 4.** (Top row, left to right). 4(a). Plots the equation  $(X^2-1)^2=Y^2*(3+2*Y)$ . 4(b). The result of the equation  $X^2+Y^2=400*(SINX+SINY)$ . 4(c). See Table 1. The 'face' equation. 4(d).  $r=SIN(t+2*SIN(r+SINt))^2$ . 4(e). The plot of the mystery equation, written using only eight characters

```
500 X = x1: Y = y1: closer_ret = 1:
GOTO 800
510 a = result
520 REM next statement
.....
600 X = x2: Y = y2: closer_ret = 2:
GOTO 800
610 b = result
620 REM next statement
.....
800 REM 'Closer'
810 REM result in 'result'
.....
890 ON closer_ret GOTO 510,610
```

Errors can now be trapped, and execution resumed at the correct line with a GOTO, since the values of variables such as closer\_ret and result will be preserved intact. The routine FNeval uses the illegal word ERROR to cause a Basic error, so that the curve is not plotted across the boundary between different sheets.

Incidentally, an alternative way of implementing subroutine calls without using ON...GOTO is to use GOTO N, where N is a variable set to the line number to return to. However, this method has the disadvantage that the variables would have to be altered if the program was renumbered.

When you have first typed the program in, it's advisable to leave out the ON ERROR statements and test the program with a well-behaved function, such as  $Y = X^2$ , to show up any typing errors.

The main section of the program, lines 500 to 840, scans the X-Y plane horizontally and

vertically. At each step, routine 'Closer' is called (line 600) to try to locate a branch of the curve. At each step towards the curve the program plots a point in red (lines 730 and 740) to show where the program is looking. Line 740 should be omitted if you do not want this feature. If routine 'Closer' does not find the curve, it makes up to 20 attempts before giving up its search and moving on to another cell.

If 'Closer' finds the curve within a scanning cell, the program branches to line 630, which plots a point and then follows along the curve by calling 'Follow'. The routine plots along the curve in one direction, line 650, and then starts from the same point and follows it in the opposite direction, line 680. Finally, the routine 'Plot' is called to plot a point or a line segment. Because 'Closer' may find a branch of the curve which has already been plotted, 'Plot' tests the screen with the POINT function before finally plotting, and 'Follow' will stop following a branch once three 'hits' have occurred.

'Closer' and 'Follow' both work by evaluating the function at four points in a square around the current point, and then testing to see whether there is a zero within the square. If 'Follow' loses the branch of the curve that it was following, it calls 'Closer' up to 20 times to try to find it again (lines 1310-1350) before giving up.

Finally, the program draws axes (lines 860 to 890), and waits for a key. If at this point you press the Space bar, a screen dump will be saved to disc; press Escape to exit otherwise.

Many of the parameters used by the prog-

ram affect the speed of plotting, the accuracy of the final plot, and the program's ability to find small details in the curve, such as poles. The parameters concerned are: the arc length, arc; the resolution within each pixel square, epsilon; the scan cell size, xs and ys; the number of iterations of 'Closer' before moving to a new scan cell, ns and nn; the criteria for finding the curve, lines 1040 and 1050; and the number of 'hits' before a branch is no longer followed, line 1390.

## Sample curves

Table 1 shows the parameters used to plot the curves in figures 1 to 4. In addition, line 770 of the program was omitted for these plots.

A lot of fun can be had inventing curves for the Spider to plot. The equation of the curve can include any Basic function, including SGN, ABS, and INT. Remember though that the 'raise to the power' operator is not defined for negative powers that are not exact integers.

To conclude the article we present five more unusual examples. Figure 4(c) is not as complicated as it looks, and shows how different curves can be superimposed by multiplying them together. The curve is the product of three simpler equations, each of which provides a different part of the 'face'. Figure 4(d) is one of a family of closed curves. Try the effect of altering the constant '2', or multiplying the innermost term  $(r+SINt)$  by a constant. Finally, figure 4(e) is left as a puzzle; the equation can be written using just eight characters!

See the index to yellow pages on page 113 for details of where to find the Spider listings.



# MORLEY ELECTRONICS

The Morley Teletext adapter introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than eight years ago, will be fully compatible with any future advances in the Teletext system.

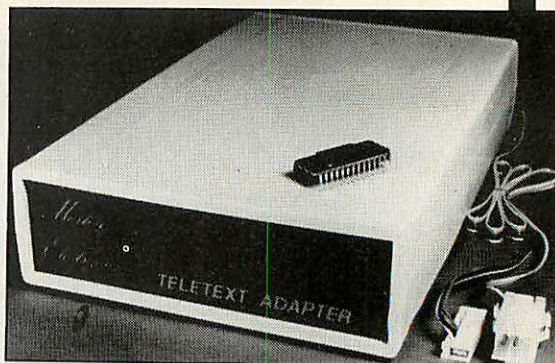
With the Morley adapter you will get a unit that automatically tunes itself in to the required station (no more messing around with screwdrivers in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

For technical details please ring Morley Electronics on Tyneside (091) 262 7507

## FEATURES

● Advanced design uses the latest technology will handle ANY future enhancements to the Teletext system eg: full field: 8 bit data transfer: 2k pages etc.

- Simply plugs into the Plus 1 interface.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and Osword commands for access from BASIC programs.
- No user-RAM required (PAGE remains at default value).
- FREE Telesoftware, no access charges. (at present updated weekly.)
- Save selected pages to disc/tape for later retrieval.
- Full access to all Teletext services and channels eg: CEEFAX, ORACLE, 4-TEL.
- Gives you a real-time clock at your disposal (\*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.



● Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).  
**ELECTRON TELETEXT ADAPTER**  
Electron adapter now available, including emulated Mode 7 allowing you to run long Adventure type programs. Please ring for details.

Now available the first true MEGA capacity RAMdisc for the BBC or MASTER computers.

This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, battery backup and a comprehensive user guide, add to this our usual 12 months no quibble guarantee and we're sure you'll agree Morley have done it again.

## FEATURES

1 Megabyte of RAM connected to the 1 MHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase in speed, for example, a 20K mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc.

The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any DFS.

The RAMdisc can be selected by a \* command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive no. is 4.

'Dangerous' \* commands such as \*COMPACT, \*COPY, \*BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a \* command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the \* command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a \* command.

The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.

Catalogue structure allows up to 2,709 files.

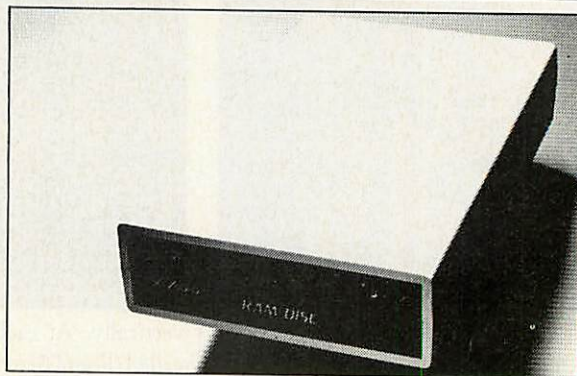
## APPLICATIONS

Programs and ROMs can be written to take advantage of directly accessing a single RAMdisc, allowing the possibility of spreadsheets with more than 512 x 512 cells, million-character documents with immediate access and editing of any section, manipulation of 2 floating-point arrays each with 228 x 228 elements, a fast-access database with 10,000 100-character records, or even just a large printer buffer!

Accessible through the user's software for direct storage of eg: basic procedures, variables, large arrays etc which can be downloaded into the BBC's RAM or read directly. (We are hoping to be able to supply an extended basic ROM late this year, to allow 'transparent access' to the Ramdisc, which will effectively expand the BBC's RAM to about 1020k.)

## OPTIONAL SIDEWAYS RAM UTILITY (suitable for use with any 16k SWR)

Sideways ROM images can be saved to the RAMdisc under a special directory which, when enabled, will be used when an unrecognised \* command is trapped for the ROM to load sideways ROMs from disc into sideways RAM. The \* command will then be



passed to the new ROM image and if still unrecognised the next ROM will be loaded. If no ROM loaded from the RAMdisc intercepts the \* command it will be passed to the current filing system as usual. ROMs on RAMdisc can be individually disabled in the same manner as 'real' ROMs in the BBC itself. Up to 104 8k ROMs can be saved onto the standard 1Mb RAMdisc, and the total load time (excluding time taken by the ROMs to process the command) for 100 ROMs is just under 9 seconds. All relevant control software for disabling/enabling ROMs etc. is provided. (Supplied on ROM.)

**EPROM PROGRAMMER** now available programs 8, 16 and 32k EPROMS connects to the user port software available on rom or disc.

Version 1 economy uncased with standard DIL socket.

Version 2 deluxe cased with ZIF socket.

**DESFA 7** - Now you can run your own TELETEXT service! Incorporates the powerful editing facilities of DESIGN 7, again with Teletext adapter interfacing.

Stores up to 100 of your screen designs on a 40Tk disc or 200 on an 80Tk. Page selection by 3-digit number HOLD, REVEAL, page linking, individual page delays etc.

PLUS - a powerful CAROUSEL facility permits continuous slide-shows. Only one disc access for every 16 screens - reduces wear on drives. Smooth animation, variable speed text printing, built in printer dumps. Sample data disc and 22 page manual included. Beats all other systems for ease of use and versatility.

## M/B software DESIGN 7

Easily the best value Mode 7 screen designer on the market today. Design any mode 7 screen, from simple MENU pages to full CEEFAX standard. This program is an invaluable aid. Designs can be saved to disc as automatically numbered files or the program will convert the screen into a Basic Proc.

INTERFACES DIRECTLY WITH ADAPTER allowing CEEFAX-ORACLE pages to be selected and dropped into editor screen for alteration, saving, or conversion to BASIC. Allows channel change from within program.

To order please fill in and send order form to: **MORLEY ELECTRONICS, Unit 3, Maurice Road Industrial Estate, Wallsend, Tyne and Wear NE28 6BY.**

Please send me. Qty. ☐ Morley Teletext adapters  
Qty. ☐ Teletext software on Rom  
Qty. ☐ Teletext software on Disc  
Qty. ☐ M/B DESIGN7 screen designer  
Qty. ☐ Teletext utilities on Disc  
Qty. ☐ Optional PSU

@ £74.45 inc. VAT & P&P.  
@ £24.95 inc. VAT & P&P.  
@ £23.95 inc. VAT & P&P.  
@ £8.95 inc. VAT & P&P.  
@ £5.95 inc. VAT & P&P.  
@ £9.95 inc. VAT & P&P.

Qty. ☐ 1 Mbyte RAM disc  
Qty. ☐ 2 Mbyte RAMdisc  
Qty. ☐ Utils ROM  
Qty. ☐ Eprom Programmer V.1  
Qty. ☐ Eprom Programmer V.2  
Qty. ☐ Desfax

@ £199.95 inc. VAT & P&P.  
@ £349.95 inc. VAT & P&P.  
@ £18.95 inc. VAT & P&P.  
@ £18.95 inc. VAT & P&P.  
@ £27.95 inc. VAT & P&P.  
@ £24.00 inc. VAT & P&P.

**NB. ROM or Sideways RAM software must be purchased with Teletext Adapters.**

Total £



Please delete 40/80

NAME \_\_\_\_\_ PHONE No. \_\_\_\_\_ CHEQUE No. \_\_\_\_\_

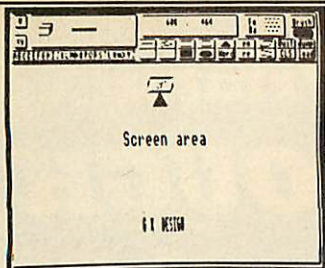
ADDRESS \_\_\_\_\_

POSTCODE \_\_\_\_\_

Please allow 28 days for delivery.

**NOW  
AT  
NEW PREMISES**





# GX DESIGN

## An all-purpose draughting system

The software is driven by an analogue joystick, a tracker ball or from the keyboard offering a competitively priced entry to a high resolution applications tool. Its simplicity of use belies the complexity of design which can be drawn using the package although it is also ideal for line plans and layouts.

- \* Written in Mode 0 for the highest resolution.
- \* Access to 78 icons all of which can be designed by the user on a 27 x 27 matrix re-oriented through 90 degree stages.
- \* Icons can be used as brushes or individual images.
- \* Any part of the screen can be enlarged, reduced, copied, reflected or isometrically altered.
- \* 64 patterns are available for in-filling or background effects.
- \* Printing can be black on white or the inverse allowing simple hidden line removal for solid or see-through objects.

- \* Definition can be enhanced by the erasure of individual pixels.
- \* 2D images can be transformed to 3D using the isometric functions.
- \* 7 selectable screen display colours.
- \* Mode 0 text can be expanded to any size.
- \* Accurate measurement is achieved through the combination of the x & y coordinates and a grid overlay definable up to 40 x 40.
- \* Built in Epson screen dump or provision for a specific printer dump routine.
- \* Screens may be saved and loaded and re-edited.

Only **£12.95** fully inclusive

**TO ORDER:** Please send cheque/PO payable to PAEAN Systems. Specify 40 or 80 Track disc. Orders are normally despatched by return of post at 1st Class rates.

**OTHER TITLES:** Please send SAE for our full list.

**PROGRAMMERS:** We are always interested to market original quality software for the BBC Micro on specialist subjects.



Little Bealings, Woodbridge, Suffolk IP13 6LT.  
Tel: (0473) 623757

AA182

## B + S COMPUTING (NOTT'M) LTD

### 55 CEDAR AVE, LONG EATON

### NOTTINGHAM ☆ NG10 3JQ

BUSINESS SYSTEMS ☆ HARDWARE ☆ SOFTWARE  
VIDEO SYSTEMS ☆ MEDIA SUPPLIES

Callers welcome to our Distribution Centre. Please phone for appointment.

**Telephone: 0602-736273**

#### Acorn Products

BBC Master 128	£404(a)
BBC Master ET (Econet filing system only)	£328(a)
Turbo Upgrade	£102(c)
Turbo 512 Upgrade	£329(a)
SC Upgrade	POA
Master Eprom Cartridge	£13(e)
64K Upgrade kit for B+ 64K	£29(d)
Z80 Second processor	£324(a)
6502 Second processor	£164(a)
1770 Disc Interface	£40(e)
ADFS ROM (BBC B+ or BBC B with 1770 Interface)	£25(e)
Games Paddles	£16(d)

#### Dot Matrix Printers

Kaga KP810 80col/180cps + 27cps NLO	£219(a)
Mannesmann Tally MT80 + 80col/100cps	£161(a)
Mannesmann Tally MT85 80col/180cps + 45cps NLO	£299(a)
Mannesmann Tally MT86 136col/180cps + 45 cps NLO	£399(a)
Epson LX80 80col/100cps + 22cps NLO	£189(a)
Epson FX85 80col/160cps + 32cps NLO	£329(a)
Epson LQ800 80col/200cps + 67cps NLO	£494(a)
Juki 5510 80col/180cps 30cps NLO	£229(a)

#### Plotters

Epson H180 A4	£329(a)
---------------	---------

#### ★Special Printer Offers★

Juki 6100 (Daisywheel) 20cps	£252(a)
MP Daisy Junior (Daisy wheel) 14cps	£149(a)
Canon PW1080A (Dot Matrix) 80col/150cps + 27cps NLO	£244(a)
Citizen 120D 80col/120cps + 25 cps NLO	£150(a)

☆ All Citizen Printers have a two-year warranty ☆

#### Printer Accessories

Epson 8143 Serial Xon/Xoff + OK Buffer	£26(d)
Epson 8148 Serial Xon/Xoff + 2K Buffer	£55(d)
Mannesmann Tally MT80 + RS232C + OK Buffer	£39(d)
Epson LX80 Ribbon (Compatible)	£2.89(e)
Epson 8302 LX80 Tractor Unit	£19(c)
Epson 8338 Single Sheet Feeder	£49(b)
Epson MX180/FX80/FX85 Ribbon (Compatible)	£2.24(e)
Mannesmann Tally MT85/M86 Font Cartridge	£17(e)
Centronics Parallel Printer Lead (1.5m)	£7.50(e)
☆ Comprehensive range of Accessories supplied ☆	

#### Monitors

Philips BM7502 High res mono green + sound	£69(a)
Philips BM7522 High res mono amber + sound	£74(a)
Philips CM8501 STD res colour RGB + sound	£174(a)
Philips CM8533 Med res colour RGB + composite video + sound (Green screen switchable)	£239(a)
Philips CF1114 TV/RGB monitor	£169(a)
Microvitec 1431MS STD res colour RGB	£179(a)
Microvitec 1451MS Med res colour RGB	£224(a)
Microvitec 1441MS High colour res RGB	£375(a)
BBC Master Monitor Plinth	£12(b)
☆ All monitors are supplied with a free BBC lead ☆	

#### Disc Drives

Opus single SS 40T 100K	£73(a)
Opus single DS 40/80T 400K	£91(a)
Opus single DS 40/80T 400K + PSU (dual case)	£109(a)
Opus dual DS 40/80T 800K PSU	£214(a)
Opus Challenger 3:256K Ram disc	£165(a)
Opus Challenger 3:512K Ram disc (2 x 256K)	£200(a)
UFD Dual DS 40/80T 800K + PSU On Master Plinth	£244(a)

#### Discs

3M 744 SS/DD 48TPI 5.25" (Box of 10)	£11(d)
3M 745 DS/DD 48TPI 5.25" (Box of 10)	£13(d)
3M 747 DS/DD 96TPI 5.25" (Box of 10)	£17(d)
3M 35SS SS/DD 3.5" (Box of 10)	£23(d)
3M 35DS DS/DD 3.5" (Box of 10)	£23(d)
Floppicide Head Cleaning Kit (20 Discs)	£15(d)
Library Cases £1.50(e) or £1.00 if purchased with discs	

#### Fanfold Paper and Labels

2000 x 1 part 60gm 11" x 9.5" STD perf	£10(c)
1000 x 1 part 85gm 11" x 9.5" Micro perf	£9(c)
2000 x 1 part 60gm 11" x 15" STD perf	£15(b)
1000 x 1 part 90gm Perfect A4 Micro perf	£12(c)
1000 x 2 part NCR 60gm 11" x 9.5" STD perf	£17(b)
1000 Labels 90mm x 36mm	£4(d)
1000 Labels 90mm x 49mm	£6(d)
1000 Labels 102mm x 36mm	£5(d)
Please state single or twin row when ordering labels	

#### AMX Mouse And Software

AMX Mouse And Super Art	£65(d)
AMX Pagemaker (For BBC B or BBC B+)	£37(d)
AMX Pagemaker (For BBC Master Series)	£37(d)

#### Modems

Miracle WS2000 + BBC Lead	£100(c)
Miracle WS2000 Auto Dial Board	£28(d)
Miracle WS2000 Auto Answer Board	£28(d)
Miracle Databeeb Communications ROM	£24(e)
Miracle WS3000 V2123 + BBC Lead	£263(a)
Miracle WS3000 V22 + BBC Lead	£459(a)
Miracle WS3000 V22bis + BBC Lead	£59(a)
Pace Nightingale + Commstar + BBC Lead	£114(c)
Nightingale Auto Dial/Auto Answer Board	£44(d)
Nightingale Auto Dial/Auto Answer Software	£10(e)
Pace OBBs Bulletin Board Software	£19(e)
**** Please Note: BAPT Approval on Modems Only ****	

#### Languages

Micro-Prolog	£49(d)	ISO-Pascal	£42(d)
BCPL	£37(c)	Forth	£32(e)
		Comal	£32(e)
		Lisp	£32(e)

#### Business Software

View 2.1	£37(d)	View Sheet	£37(d)
View 3.0	£37(d)	View Store	£37(d)
View Spell	£37(d)	View Plot	£21(e)
Hi-View	£37(d)	View Index	£10(e)
View Printer Driver Generator	Tape £7(e)	Disc £8(e)	
Inter-sheet	£39(d)	Inter-chart	£26(d)
Inter-word	£39(d)	Inter-base	PO.A.
Wordwise	£30(d)	Wordwise Plus	£41(d)
Fleet Street Editor (Please State 40T or 80T)			£31(d)

#### Books (No VAT on Books)

Master Reference Manual: Part 1	£14(d)	Part 2	£14(d)
Advanced Master Reference Manual			£19(d)
ISO Pascal	£6.50(e)	Forth	£6.50(e)
View Guide	£4.50(e)	Into View	£4.50(e)
View 3	£9(e)	View Sheet	£9(e)
Lisp	£6.50(e)	View Store	£9(e)
☆ Large Range supplied - phone for details. ☆			

#### Rom Boards

ATPL 'Sidewise'	£36(d)
Computer Village CV16 x 2	£37(d)

**UK Customers: please add 15% VAT to all prices (including carriage).** Government and educational establishments official orders welcomed. When ordering please enclose a cheque or postal order for the appropriate amount. Carriage Rates: (a) £8.50 - overnight insured delivery (b) £3.50 (c) £2.50 (d) £1.50 (e) £1.00. All prices are correct at time of going to press. All offers are subject to availability. All prices are subject to change without prior notification and are available on request. Current price list is available on request.

AA279



# Real Correspondence Quality Printer **PRICE BREAKTHROUGH**

## QUENDATA DWP 1120 DAISYWHEEL PRINTER

### A HOST OF USEFUL FEATURES INCLUDE:-

- Standard parallel/centronics interface
- 20 c.p.s. (approx 200 words/minute)
- Easily obtained Qume ribbons
- Uses Qume daisywheels (many typefaces available)
- 10, 12 and 15 pitch options
- Maximum paper width 13 inches
- 3 levels of hammer impression
- Comes complete with power lead, plug, ribbon, courier 10 wheel, manual and cover
- Tractor and cut sheet feeder available

TRADE PRICE £178.25 INC. VAT. REC. RETAIL PRICE £299.00.

OUR PRICE £199. NOW **£149.00**

Inclusive of VAT  
Delivery by courier (U.K. mainland only) £8

**ORDER NOW WHILE STOCKS LAST**

Free to callers only (with printer purchase) View printer driver.

All major credit cards accepted.

Telephone orders: Gerrards Cross (0753) 889010

# SOFTSHOP LTD

55 ST. PETERS COURT, CHALFONT ST. PETER, BUCKS SL9 9QQ

AA119

## EPROMS \* RAMS \* DISKS

Lowest Prices/Fastest Delivery/Quality chips for the BBC  
Prices INCLUDE VAT and UK post, normally by return

NEC 2764C once only progr. 2-5 pcs £1.75, 6+ pcs £1.45  
Fujitsu 2764 1-2 pcs £2.50, 3-9 pcs £2.25, 10+ pcs £2.15  
Hitachi 2764 1-2 pcs £2.95, 3-9 pcs £2.55, 10+ pcs £2.40  
Fujitsu 27128 1-2 pcs £3.35, 3-9 pcs £2.70, 10+ pcs £2.50  
Hitachi 27128 1-2 pcs £3.35, 3-9 pcs £2.95, 10+ pcs £2.70  
Hitachi 27256 1-2 pcs £5.25, 3-9 pcs £5.00, 10+ pcs £4.30  
Hitachi 6264LP15 (ATPL, Watford) 1-9 pcs £3.40, 10+ pcs £2.90  
41254/41464-15 (upgrading Solidisk) £6.00 each  
41416/48416 (upgrading Watford) £2.95 each  
41256-15 1-2 pcs £3.30, 3-7 pcs £3.00, 8+ pcs £2.75  
DISKS DS/DD 96 TPI. Hub-ring/Sleeve. Box of 10 £8.95

Send UK cheques/PO  
LA or Gov't Orders to:

**SILICON CITY**

Mithian, St. Agnes, Cornwall TR5 0QE

Access/Visa orders, telephone 087 255 2112

AA266

## POOLSWINNER

THE ULTIMATE POOLS PREDICTION PROGRAM

- **MASSIVE DATABASE** Poolswinner is a sophisticated Pools prediction aid. It comes complete with the largest database available - 22000 matches over 10 years. The database updates automatically as results come in.
- **PREDICTS** Not just SCOREDRAWS, but ALWAYS, HOMES and NO SCORES.
- **SUCCESSFUL** SELEC guarantee that Poolswinner performs significantly better than chance.
- **ADAPTABLE** Probabilities are given on every fixture - choose as many selections as you need for your bet. The precise prediction formula can be set by the user - you can develop and test your own unique method.
- **SIMPLE DATA ENTRY** All team names are in the program. Simply type in the reference numbers from the screen. Or use FIXGEN to produce fixture list automatically (see below).
- **DISC/MICRODRIVE COMPATIBLE** Tapes supplied with conversion instructions.
- **PRINTER SUPPORT** Full hard copy printout of data if you have a printer.



Boxed, with detailed instruction booklet

PRICE £15.00 (all inclusive)

**NOW AVAILABLE**

**FIXGEN 86/7**

AT LAST! No more struggling for hours to get the fixture list into the computer. FIXGEN has been programmed with all English and Scottish fixtures for 1986/7. Simply type in the date, and the full fixture list is generated in seconds. Fully compatible with Poolswinner. Yearly updates available.

POOLSWINNER with FIXGEN £16.50 (for both)



## COURSEWINNER V3 THE PUNTERS COMPUTER PROGRAM

NOT JUST A TIPSTER PROGRAM, Coursewinner V3 can be used by experts and occasional punters alike. You can develop and test your own unique winning system by adjusting the analysis formula, or use the program in simple mode. Coursewinner V3 uses statistical analysis of major factors including past form, speed ratings, course statistics, prize money, weight, going, trainer and jockey form etc, etc. It outputs most likely winners, good long odds bets, forecasts, tricast etc. The database includes vital course statistics for all British courses. You can update the database - never goes out of date.

PRICE £15.00 (all inclusive) includes Flat AND National Hunt versions.

ALL PROGRAMS AVAILABLE FOR: AMSTRAD CPCs, AMSTRAD PCWs (ADD £3.00), ALL BBCs, ALL SPECTRUMS, COMMODORE 64/128, ATARI (48K+), SINCLAIR QL.  
Supplied on tape (simple conversion to disc) - except PCW (on 3" disc) and QL (on microdrive)

Send Cheques/POs for return of post service to...



phone 24 hrs



SOFTWARE

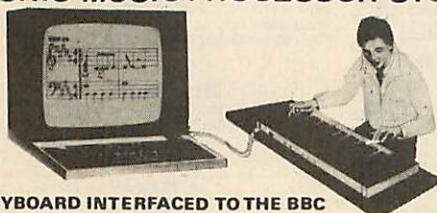
37 COUNCILLOR LANE, CHEADLE, CHESHIRE. ☎ 061-428 7425

(Send for full list of our software)



phone 24 hrs

## Micro Musician POLYPHONIC MUSIC PROCESSOR SYSTEM



A CASIO KEYBOARD INTERFACED TO THE BBC  
PLUS A PROFESSIONAL 8PART MUSIC EDITOR ON DISC

For only £199 +VAT (MINI KEYBOARD) £249 +VAT (FULL SIZE KEYBOARD)

\*Teaching \*Performance \*Composition \*Music Printing \*Traditional Notation  
\* Scrolling Colour Display \*Parts Analysis \* Many unique outstanding features

**MICRO MUSICAL LTD**

37 Wood Lane, Shilton, Coventry CV7 9LA. Telephone (0203) 616760



## HIGH SPEED CP/M COMPATIBILITY AT LOW COST, WITH

## Micro Developments

### THE MD512k UNIVERSAL SECOND PROCESSOR SYSTEM.

MICRO DEVELOPMENTS [MD512k] system is a Z-80 CP/M Compatible Universal Second Processor. We consider its use to be 'Universal' because it may be connected to ANY home computer which has a serial port and is capable of emulating a simple terminal. This enables your computer to gain access to the vast world of CP/M Software. Simply load your terminal program, (one provided for the BBC) plug our system into your serial port and away you go.

The [MD512k] Complete System comprises:

- Single printed circuit board system controller.
- Floppy Disc Drive (500k or 400k when formatted, 40 track double sided).
- Half Million Byte HIGH SPEED Memory Drive, running up to 10 times faster than a floppy disc drive and 5 times faster than a hard disc drive! Able to hold the entire contents of the floppy drive.
- Two RS232 serial ports one of which connects with your computer.
- Switch Mode power supply, cables and case.
- Supplied with FREE CP/Z Operating System and Utility disk and also a simple terminal program for the BBC.

Note The CP/Z Operating system provided is completely CP/M 2.2 Compatible but has many advanced features and is far more user friendly.

For those of you who already have a Floppy Disc Drive which may be set to 40 track then you can save money by purchasing the MD512k PCB controller ONLY and connecting on your own drive.

The [MD512k] Printed Circuit Board (Controller) Comprises:

- Single Board Construction 234 x 234 mm (9.2 x 9.2 ins).
- Only a single +5v supply required.
- On Board DC-DC converter for RS232 Communications.
- Z-80 Micro Processor.
- Z-80 CTC (Counter/Timer Chip).
- 512k R/W RAM. 524,288 bytes of HIGH SPEED MEMORY DRIVE.
- Simple Hardware DMA, for user defined memory manipulation.
- 32k byte EPROM expansion port.
- Two RS232C Serial ports each with 16 programmable Baud rates.
- MD2797 Floppy Disc Controller set up for 5.25 or 3.5 or 3 inch, 500k (400k formatted) 40 track double sided, double density floppy drive.
- Expansion edge connector for future Hard disk interface.
- Supplied with FREE CP/Z Operating System and Utility disk and also a simple terminal program for the BBC.

The MD512k P.C.B. Cost is only \*\*\* £295.00 \*\*\* (Including VAT & Postage).

The MD512k Complete System Cost \*\*\* £495.00 \*\*\* (Including VAT & Postage).

Send Large S.E.A. for further details or place a Mail Order direct to the manufacturers at:

75/77 QUARMBY ROAD, QUARMBY, HUDDERSFIELD, WEST YORKSHIRE, HD3 4EA.  
TEL. (0484) 646232

## CAREY ELECTRONICS

computing and communications

For The BBC MICRO & MASTER SERIES  
Computers - Peripherals - Software

### THE ACORN BBC 'MASTER SERIES'

Master '128'	449.00
Master 'Turbo'	624.00
Master '512'	P.O.A.
Master 'Scientific'	P.O.A.
Master 'ET' Econet Terminal	399.00
6502 Second Processor	199.00
280 Second Processor	399.00
Acorn 'Prestel' Adaptor	139.00
Acorn 'Teletext' Adaptor	149.00
Acorn 'IEEE 488' Interface	325.00

### ALL SOLIDISK PRODUCTS AVAILABLE

Acorn 1770 DFS	49.95
Acorn ADFS ROM	29.99
Acorn 'Turbo' Co-Processor	125.00
A.T.P.L. 'Sidewise' ROM Board	43.70
Grafpad II	59.50
A.M.X. Mouse	49.95
MONITORS (14" R.G.B.) & (12" Mono):	
Microvitec	from 249.00
Philips CF1114 (monitor/T.V.)	209.95
Philips BM7502 (12" Green)	87.95

We supply all ACORN and ACORNSOFT products plus Monitors, Disk Drives, Printers, Plotters, Modems, Light Pens, AMX Mouse

THE ACORN BBC 'MASTER SERIES' - IN STOCK 'Model B' Taken in Part Exchange

DISK DRIVES by - CUMANA - OPUS - PACE - U.F.D.

BABT approved MODEMS by - MIRACLE TECHNOLOGY - PACE - TANDATA

### UFD DISK DRIVES:

UFD MD 400 A	(Single D/S 400K without PSU)	119.95
UFD MD 400 B	(Single D/S 400K with PSU)	139.95
UFD MD 802 E	(Dual D/S 800K with PSU Stacked)	274.95
UFD MD 802 DM	(Dual D/S 800K with PSU 'Master' version)	299.95

- All drives include cables, formatting disk & instructions •

### UFD WINCHESTER DISC DRIVES:

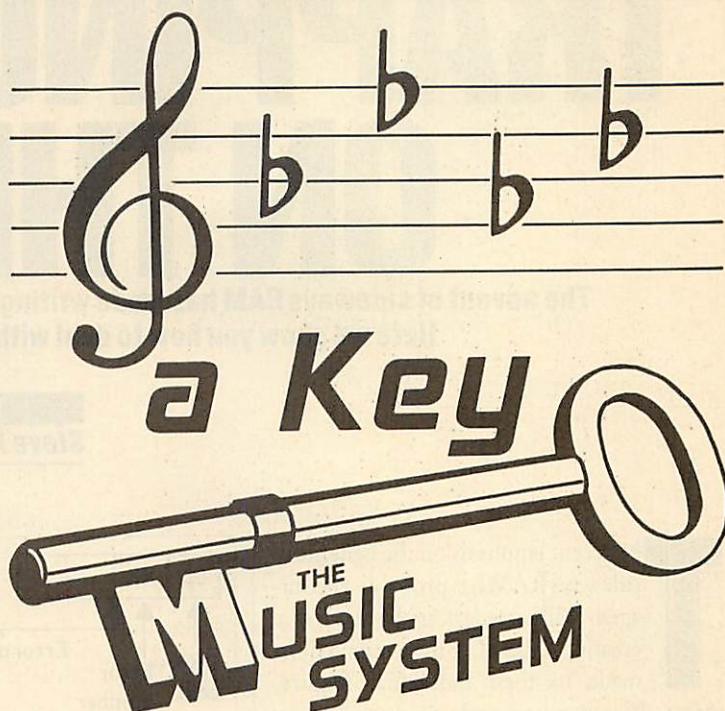
HD 2000 (20MB)	799.95	HD 4000 (40MB)	1299.95
Including PSU, Winchester Controller Card & BBC Host Adaptor Card			
ARCHIVE	(10MB Tape Streamer & 1MB Floppy, for use with HD drives)		999.95
NUCLEUS 20 (20MB)	1799.95	NUCLEUS 40 (40MB)	2299.95
Also including 10MB Tape Streamer & 1MB 40/80 Track Floppy Disk Drive			

It's AFTER the SALE, that SERVICE counts!!

Prices correct at time of publication and include V.A.T. at 15%

7 Church Road, WALTON-ON-NAZE, Essex. CO14 8DF  
Tel: Frinton-on-Sea (02556) 6993 (9am to 9pm)

Now works on BBC Master,  
B+ and ALL dfs and ddfs  
(inc. SOLIDISC and WATFORD)



Is the most advanced micro based music  
program for the BBC microcomputer



Is sophisticated, yet simple to use



Features unparalleled create, edit, play  
and print tunes facilities



Has a Song and Sound Library bringing  
everyone into immediate harmony



The acclaimed Instruction Manual unlocks  
all the secrets to its successful and easy use



OPEN THE DOOR TO YOUR MUSICAL  
IMAGINATION



BUY THE MUSIC SYSTEM TODAY !

DISC PACK EDITOR · SYNTHESISER · KEYBOARD · LINKER · PRINTOUT · SONG AND  
SOUND LIBRARY £29.95 INC VAT CASSETTE 1 · KEYBOARD · SYNTHESISER ·  
SOUND LIBRARY · £14.95 INC VAT CASSETTE 2 EDITOR · PRINTOUT · SONG AND  
SOUND LIBRARY £14.95 INC VAT PLEASE ADD £1.25 P&P PER ORDER

ADDITIONAL SONG LIBRARY DISC 2 TOCCATA AND CAROLS · 3 400 YEARS OF MUSIC  
4 MAINLY BACH · 5 IAN WAUGH ORIGINALS · 6 OLD FAVOURITES ·  
£4 EACH INC VAT · POSTAGE FREE

NEW UTILITIES DISC KEYBOARD · MUSIC FILE CONVERTER · PLAY FROM BASIC UTILITY  
· TMS MUSIC FILE CONVERTER · £6 INC VAT · POSTAGE FREE

ECONET VERSION £89.70 INC VAT PLUS £1.25 POSTAGE · AMSTRAD AND  
COMMODORE 64 VERSIONS ALSO AVAILABLE

ORDERS TO: SYSTEM, DEPT A, COLLEGIATE CRESCENT,  
SHEFFIELD S10 2BA. (0742)682321  
DEALER ENQUIRIES WELCOME.



i. ISLAND · LOGIC  
SYSTEM  
SOFTWARE





# TRAPPING ERRORS ON THE SIDE

The advent of sideways RAM has made writing your own ROMs a much more popular activity. Here we show you how to deal with error handling by sideways ROMs

Steve Picton

**T**he recent emphasis on the benefits of sideways RAM has probably encouraged many readers to have a go at creating a ROM of their own, tailor-made to their individual requirements. Whether you want to write a short utility ROM or a complete 16k language, there is usually the problem of how to deal with errors. Error handling, more specifically error handling by sideways ROMs, is what we shall be looking at in this article.

If we are programming in Basic, there are essentially two ways in which we can deal with an error situation. As an example, look at the following piece of Basic code. The idea is simply to accept two numbers from the user, and print the result of integer division.

```
10 INPUT "Input the two numbers"
;A%,B%
20 C%=A%/B%
30 PRINT C%
```

There is really only one thing that can go wrong here, namely when B% is 0. There are two ways to take care of this:

1. Leave the program exactly as it is, and allow Basic to give us a 'Division by zero' message. (Whether or not ON ERROR has been used need not concern us here.)

2. Test for B% being equal to zero in advance, ie, we could add a line like:

```
15 IF B%=0 THEN PRINT
"Impossible!":GOTO 10
```

In other words, we can often write our program in such a way that we anticipate and act upon problem situations before they arise, whether writing in Basic or Assembler. This strategy is not always possible, however, since we frequently have to pass control over to another ROM. When saving a program from Basic, for example, the Disc Filing System takes over for a while, and this has its own set of errors (eg Disc full, Not found, etc).

These type of errors are generated by the

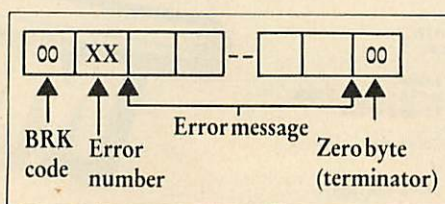


Figure 1. Message format

ROM that is processing the current command: they occur when the 6502 processor encounters a BRK instruction; eg Basic makes extensive use of BRK to deliver its error messages. For syntax see figure 1.

When the 6502 executes a BRK (opcode 00), the following events take place. (Most of these are inherent in the 6502 processor, rather than specific to the BBC micro.)

1. The address of the BRK instruction plus 2 is pushed on the stack, high byte first.
2. The status register is pushed on to the stack. The stack pointer is lowered by 3.
3. Interrupts are disabled, and bit 4 of the status register (the BRK flag) is set. This is done to allow the operating system to distinguish a BRK from an interrupt—see disassembly listings.
4. Execution continues from the address found at &FFFE and &FFFF. In OS 1.2, this address is &DC1C. If you have a different MOS, the address can be found by entering PRINT &FFFE AND &FFFF.

It is worth looking at the routine at &DC16 in detail, since it summarises very neatly the important events that ensue after a BRK. (Although it is specific to OS 1.2, the principles are common to all versions.) Figure 2 is an annotated disassembly of the relevant section of the operating system and is, of course, subject to copyright. Some general points emerge:

- If you wish to enable a particular ROM, do so by writing to &F4 and &FE30 in that order. There is no need to disable interrupts. Problems can arise if you write to &FE30 and then

&F4, because of the effect of an interrupt occurring immediately after writing to &FE30, but before &F4 is updated.

- The code from &DC29 to &DC38 extracts the return address from the stack, placed there by the 6502 as a result of BRK. This address then has 1 subtracted from it, and the result is placed in &FD and &FE. Since the return address was that of the BRK instruction plus 2, (&FD) is made to point to the byte immediately after the BRK opcode. This is usually the error number associated with the error.

- Whenever a BRK occurs, all the paged ROMs are informed with service call 6 in the accumulator. As each ROM is entered, the Y register still contains the value that it had when the BRK occurred. The original value of the accumulator is in &FC, and the X register is on the stack, buried beneath a pile of numbers resulting from JSR instructions etc. You will need to use TSX followed by LDA Absolute, X to access it.

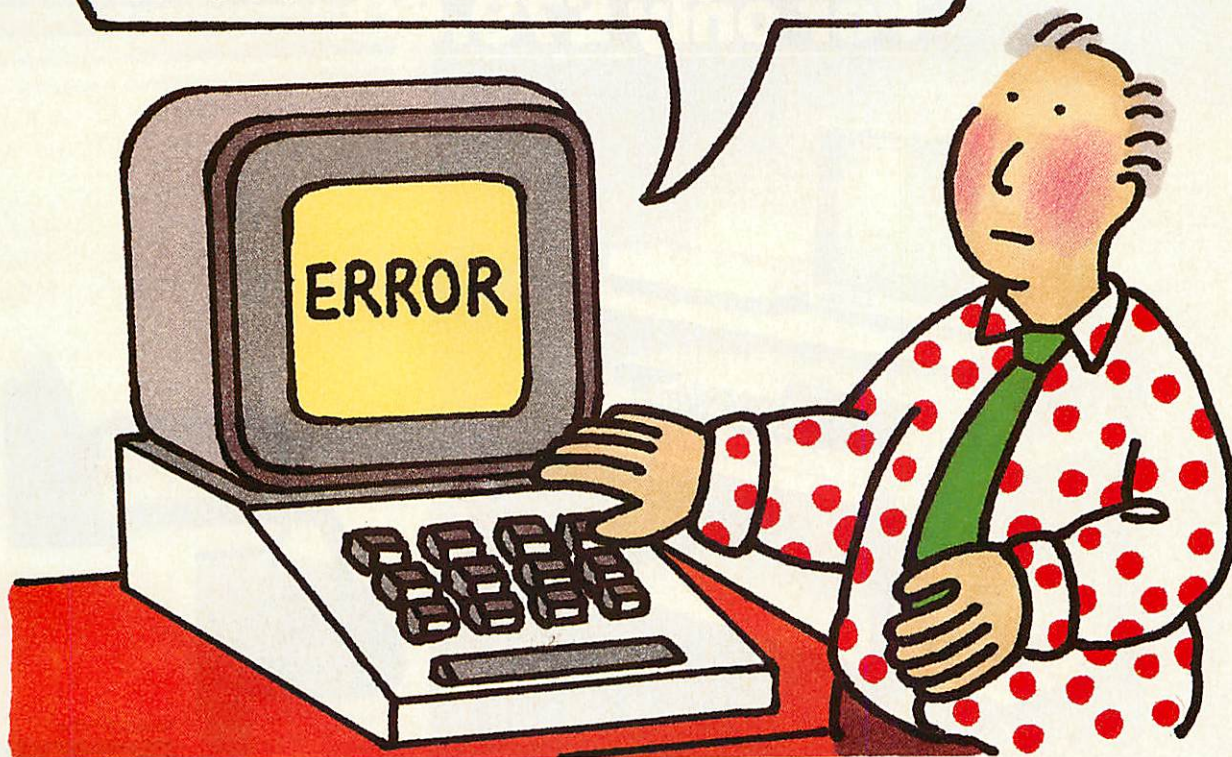
- The 'legal' method of finding out which ROM was active at BRK is via OSBYTE 186. This reads the byte at &24A, which contains a copy of the active ROM number.

It is the responsibility of the current language eventually to deal with the error. After interrogating each of the sideways ROMs, the operating system passes control back to that language via JMP (&202): &202 is in fact the Break Vector (BRKV). The language itself should set &202 and &203 to the address of its error handling routine when it is first initialised. Basic 2, for example, sets up these locations to point to &B402 and Basic 1 uses &B433.

Errors in a service ROM are easy enough to sort out. The only point to watch is that language ROMs do not expect the error message after a BRK to be in another sideways ROM. So if we are writing a ROM service routine and we wish to give, say, a 'Bad number' error,



Come on Smith, let's see a bit more effort.



then we must copy that error message to an area of RAM first, and then jump to the BRK preceding it. The bottom of the machine stack, (ie from &100 onwards) is the official error message buffer. For example, this short piece of assembler could be used somewhere in a ROM if we had detected a 'Bad number'.

```
LDY #0
BRK opcode
STY &100
Put it in &100
.loop
LDA error_message, Y
Get the character
STA &101, Y
Copy it down to the stack
BEQ done
Exit when zero terminator is found
INY
BNE loop
Go back for another character
.done
JMP &100
execute the BRK
.error_message
Error no. + "Bad number" + 00
(terminator)
```

In practice, we might choose to make a routine such as this rather more general, so that it could handle many different messages – 'Too big', 'Syntax error' and so on.

If we wish to write a language ROM, then the onus is on us to set up the correct address at &202-&203 and to supply the routine actually to handle the error. There is no reason why a language should not have several different error handling routines – the ROM must decide which one is appropriate at each stage of proceedings, and update &202-&203 accordingly. The simplest of error handling routines might have two main requirements: to print out the message after the BRK, and to re-initialise the stack pointer.

Since (&FD) points to the data immediately after the BRK instruction, it is easy to print out the message itself. Indirect indexed addressing can be used to access the bytes. We are free to choose whether or not we make use of the error number.

```
.errorhandler
LDY #0
Initialise Y
LDA (&FD), Y
Get the error number
STA &70
Put it in &70 (say)
INY
Set Y=1
.loop
LDA (&FD), Y
Get the next character
BEQ endfound
```

```
Exit when terminator found
JSR &FFEE
Print it
INY
BNE loop
Go back for another
.endfound
continue
```

The second requirement, re-initialising the stack pointer, is more subtle but equally important. Consider these two Basic expressions:

```
Print 3/0
PRINT SQR(SQR(SQR(3/0)))
```

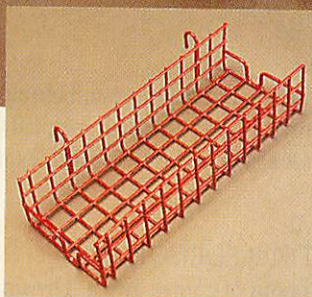
They will both of course give a 'Division by zero' error. What is not so obvious is that the machine stack will have more data on it when the error occurs in the second of the two examples. This is a consequence of the way in which Basic evaluates expressions. The important fact to emerge is the need to use LDX #255: TXS in order to prime the stack pointer after BRK, since the contents of the stack will be indeterminate. Failure to do this can eventually lead to the stack overflowing.

This month's yellow page offerings consist of two listings, both written as sideways ROMs. The first is a service ROM which will detect the command \*MOVE, and then convert the hex number after it into binary. (This would obviously be necessary if you wanted



# AT LAST A BRIGHT IDEA IN COMPUTER WORKSTATIONS

## For only £79.50.



# FREE

with every workstation ordered this Plug/Tidy basket will accommodate a 4 socket in-line distribution block.

The Klick colourframe workstation is designed to provide a highly efficient way of organising your micro system. This fully mobile unit runs on silent glide rubber tyred wheels and is ideal for use in the domestic or office environment.

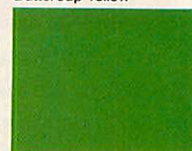
Manufactured from heavy duty steel, the framework is finished in a choice of 5 stylish colours and the high quality melamine faced chipboard shelves are available in either White or Teak effect.

This unit will accommodate your monitor, computer, printer, disk drive or cassette recorder and is suitable for use with most leading micro systems including Amstrad, BBC Acorn, Commodore and Sinclair.

This offer is available to UK Mainland residents only.



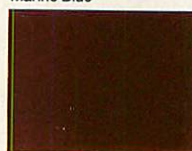
Buttercup Yellow



Leaf Green



Marine Blue



Mahogany Brown

Overall assembled dimensions are: 845mm (33 1/4") high, 810mm (31 7/8") wide and 610mm (24") deep.

To Store Stock Systems Ltd, FREEPOST Manchester M23 9BH

Please send me \_\_\_\_\_ (quantity) of units at £79.50 inc. VAT & carriage

I enclose a cheque for £\_\_\_\_\_ made payable to Store Stock Systems Ltd or debit my ACCESS/VISA

Card No.

Card expiry date \_\_\_\_\_ Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

(BLOCK LETTERS PLEASE)

Please write the number of units required in the boxes provided

Frame colour	Shelf colour	
	White	Teak
Poppy Red		
Buttercup Yellow		
Leaf Green		
Marine Blue		
Mahogany Brown		

# Klick

ADDING COLOUR TO  
COMPUTER FURNITURE



(Please allow 28 days for delivery)

B1



DC1C STA &FC	Save the accumulator	DC4D TAX	
DC1E PLA	Retrieve a copy of the status register into A	DC4E LDA &FC	Get the accumulator back
DC1F PHA	Push it back	DC50 CLI	Enable interrupts again. (Remember the 6502 automatically disables them after BRK)
DC20 AND #&10	Isolate the BRK flag	DC51 JMP (&0202)	Pass control back to the current language
DC22 BNE &DC27	Skip forward if it is a BRK	F168	This is the main 'ROM-scan' routine
DC24 JMP (&0204)	Jump to high priority interrupt handler	F168 LDA &F4	Save the currently active ROM
DC27 TXA	Save X on the stack	F16A PHA	
DC28 PHA		F16B TAXA	Move the reason code into A
DC29 TSX	Extract the low byte of the return address from the stack	F16C LDX #&OF	Indicate that ROM 15 is to be examined first
DC2A LDA &103,X		F16E INC &02A1,X	Make the sign flag reflect the type of ROM (if any) in this socket
DC2D CLD	Ensure that we are in binary mode	F171 DEC &02A1,X	Look at next one if it is empty, or Basic
DC2E SEC	Prepare for the forthcoming subtraction	F174 BPL &F183	Place a RAM copy in &F4
DC2F SBC #&01	Subtract one	&/F176 STX &F4	Enable the ROM by writing to the select latch
DC31 STA &FD	and save it in &FD	F178 STX &FE30	Enter the ROM via its service entry point, treating the ROM as a subroutine
DC33 LDA &0104,X	Get the high byte of the return address	F17B JSR &8003	Set the zero flag according to the value in A
DC36 SBC #&00	Take account of any borrow	F17E TAX	Exit if the ROM returned zero in A
DC38 STA &FE	Place it in &FE	F17F BEQ &F186	Otherwise get the current ROM number
DC3A LDA &F4	Get the currently active ROM number	F181 LDX &F4	Prepare to look at the next one
DC3C STA &024A	Place it in &24A. This means that &24A contains the ROM number that was active when the last BRK occurred	F183 DEX	Go back if there are any more
DC3F STX &FO	Save X, now the stack pointer, in &FO	F184 BPL &16E	Retrieve the original ROM number
DC41 LDX #&06	Indicate a 'reason code' of 6	F186 PLA	Enable it
DC43 JSR &F168	Inform each ROM of the error	F187 STA &F4	
DC46 LDX &028C	Get the ROM number of the current language	F189 STA &FE30	
DC49 JSR &DC16	Enable it by writing to &F4 and &FE30	F18C TXA	Move X back to A
DC4C PLA	Restore the X register	F18D RTS	Exit

**Figure 2. BRK handling routine within the operating system**

to write a utility to move a Basic program from one page to another.) Three error conditions, 'Bad Hex', 'Too big' and 'Syntax error', are reported in the manner described previously.

The second listing is written as a language.

## Program notes

Both programs assemble their code at &5000, and you will need to transfer it to sideways RAM in the normal way before it can be executed. On a B+ 128 or Master this can be done with a \*SWRITE command; for other micros, consult your RAM board manual for details of loading ROM images. As usual, setting up the red function keys with commonly used assembler mnemonics can save a lot of typing effort. Both listings start off in the 'standard' way, so that the operating system will recognise them.

## Listing 1 (Service ROM)

Lines 540-640 detect the command \*MOVE. Lines 660-700 set the two bytes for the result to zero, and get past any spaces.

Lines 720-1020 form the routine to convert a hex number to binary. The way the algorithm works should be clear when you consider the close relationship between a hex digit and its binary equivalent. We use ASL and ROL instructions to move each digit into the final

result. &70 and &71 have been used for this purpose, and it is only Basic which guarantees that these locations will be free for the user. Therefore you should not experiment with \*MOVE in any language other than Basic.

Lines 1050-1250 copy the error messages down to the bottom of the stack.

Lines 1280 actually executes the error.

## Listing 2 (Language ROM)

It is not very often that *Acorn User* publishes programs that are deliberately designed to cause errors! The way this simple language works is to give an error message describing the type of key that was pressed in response to the '?' prompt. The only exception occurs when an asterisk is entered, in which case the rest of the command is passed over to the OSCLI routine. This allows the use of, eg, \*BASIC to exit the program.

Lines 490-590 detect the command \*ERROR to start up the language.

Lines 610-630 use OSBYTE 142 to start the language.

Lines 650 is the language entry point. The first task is to set up the error vector (&202/&203) with the correct address.

Lines 720-740 initialise the stack, and enable interrupts. Languages are entered with interrupts disabled.

Lines 780-800 print out a '?', and use OSRDCH to wait for a keypress.

Lines 820-960 use a series of compare instructions to ascertain the type of key pressed.

Lines 990-1060 If an asterisk is pressed, we use OSWORD with A=0 to get a line of text into memory.

Lines 1080-1110 pass this text over to the OSCLI.

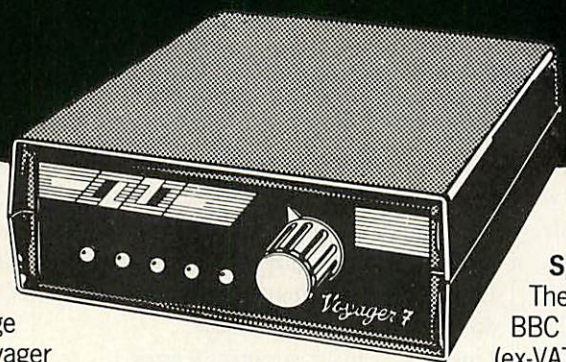
Lines 1130-1370 are the error messages themselves, following the usual format of BRK, error number, text, zero byte. Notice that we do not have to use 17 for the 'Escape' error number just because Basic does. In fact, there is no reason to adopt the error number/text/zero byte syntax, as long as you are certain that an error will never occur anywhere except your ROM. For example you could use a carriage return instead of a zero byte as an end-marker. As soon as you execute code outside your ROM however (eg, operating system calls), then the error handling routine should cater for the 'standard' form of errors.

Lines 1390-1500 are the error handler. The idea is simply to print out the error message, but we have ignored the error number. This is why LDY #1 rather than LDY #0 is used in line 1400.

Steve Picton's listings for sideways ROMs are on the yellow pages. See index on page 113.



# WORLD DOMINATION BY FRIDAY ...for only £79.95



...or Tuesday...or Thursday... the sooner you send off the coupon, the sooner you'll have the entire knowledge of the world at your fingertips. The Voyager range of Modems has full BAPT approval and is fully compatible with just about any micro throughout the world. And you could pay twice the price for a modem and still not get these features:

- Multi Speed – including 300/300, 1200/75, 75/1200 full duplex, and 1200/1200 half duplex
- Full Function LED Display
- More Software Support than any other Modem – and the best.

#### The Voyager Commsoft ROM gives you:

- All Prestel and Micronet Features supported
- Auto Dial/ Auto Answer as standard
- Telephone Directory Facility
- 40 Column/80 Column text mode
- X-Mode file transfer with automatic X-ON/X-OFF
- PSS Support
- All electronic mail features supported
- Fully compatible with BBC, BBC plus and all Masters
- All this for just £29.95 (ex-VAT).

The Voyager Commsoft ROM has already made its mark with the people who know.

'A major step forward' (Viewfax 258)

'Excellent' (Micronet 800)

And Steve Gold, hacker extraordinary writes, '...Commsoft has to be one of the best I've seen... If you are thinking of buying a modem, this has to be the package to consider'. (Telelink May/June 1986).

#### Special Introductory Offer:

The Complete Package – Voyager 7 + BBC Commsoft ROM for only £89.95 (ex-VAT). Fill in the coupon then stand by to access mainframes and micros – worldwide and multispeed.

## MODEMHOUSE

### THE SINGLE SOURCE SOLUTION

APPROVED for use with Telecommunications systems run by British Telecommunications in accordance with the conditions in the instructions for use  
S/2805-4/G/00442



Modem House,  
70 Longbrook Street, Exeter,  
Devon EX4 6AP  
As Stocked by *Boots*

Please send me: (Tick which required)

1. Voyager 7 Modem ..... £91.94 (inc-VAT) ☐

2. Complete Voyager 7 + BBC  
Commsoft ROM Package ..... £103.40 (inc-VAT) ☐

I enclose cheque/PO payable to 'Modem House' for \_\_\_\_\_

OR Access No: \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Post to: Modem House, 70 Longbrook Street, Exeter,  
Devon EX4 6AP Tel: (0392) 213355

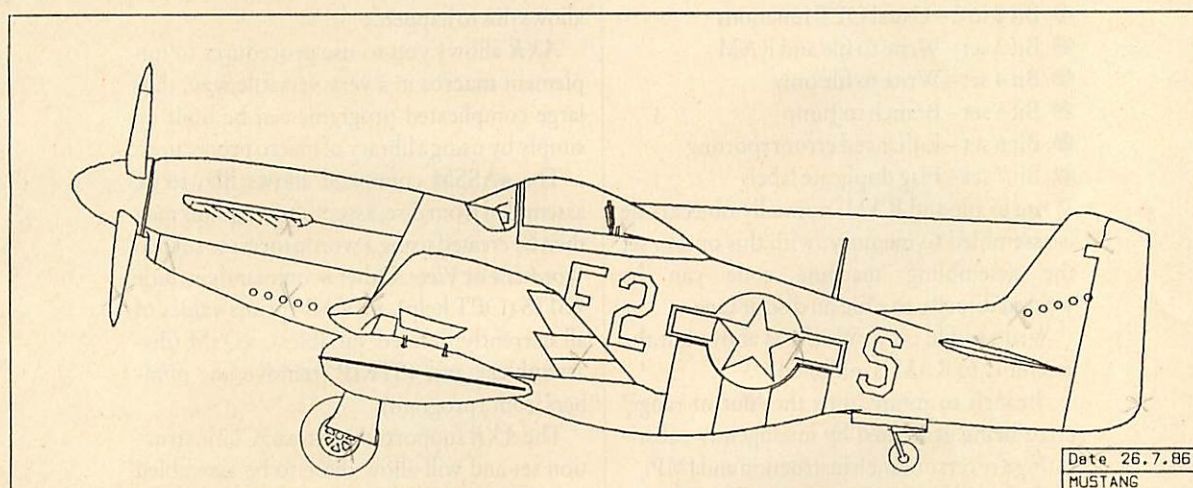
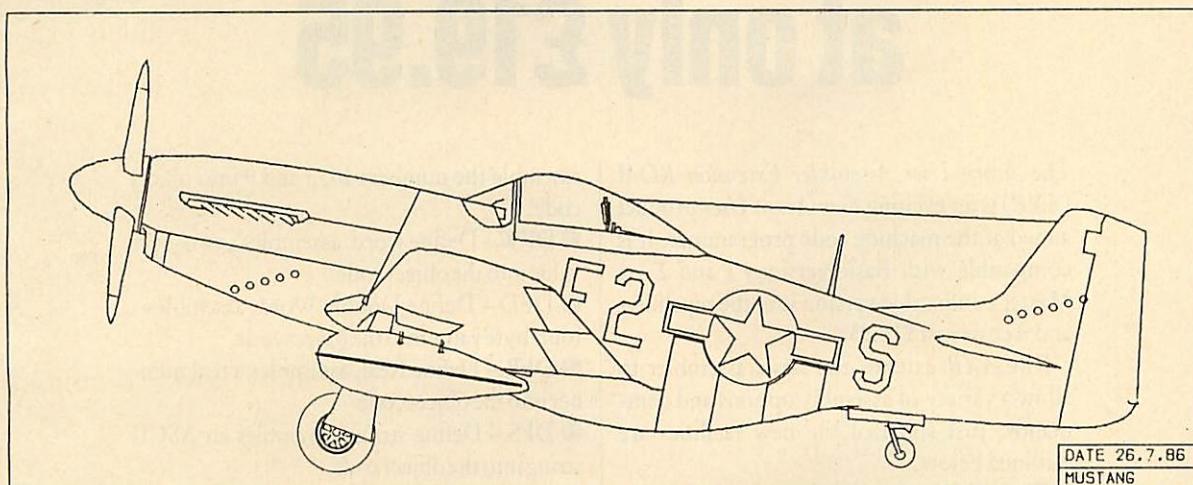
AU/10/86



# COMPETITION

## £1000 WORTH OF CAD SOFTWARE TO BE WON

Ten sets of Technomatics's *Novacad* software are up for grabs if you can spot the differences between these pictures of Mustangs drawn using the package



Spot the differences between the two drawings of a World War 2 Mustang above, and you could win a copy of Technomatics's *Novacad* software which retails at £99 plus VAT. We've got 10 to be won by sharp-eyed readers, so get those magnifying glasses out.

The drawings of the Mustang were done using *Novacad* with an Epson H180 plotter, and the lower one has 15 differences for you to find. When you've spotted them, mark them with crosses on the *bottom* picture, cut it out and put it in an envelope. Don't forget to include your name and address. The senders of

the first 10 correct entries drawn from the hat after the closing date will each win a copy of the *Novacad* package.

*Novacad* will work on a BBC micro with Acorn DFS and disc drive or Master from trackerball, mouse or keyboard, and is compatible with the 6502 second processor.

This CAD (computer aided design) package has many features usually only found on custom-designed software. Whether you want to draw a complex electronic circuit board, make architectural plans or just doodle, then *Novacad* can help.

It's user friendly and allows great detail to be incorporated into drawings. You can build up libraries of icons you've created and call on them in any of your diagrams, and you can mirror, rotate, enlarge or reduce them. There's a zoom facility enabling magnification of a section by up to 20 times to allow fine details to be added.

Send your entry to October Competition, Acorn User, 141-143 Drury Lane, London WC2B 5TF.

Closing date for entries at the *Acorn User* office is October 20.



# ROM

A C O R N U S E R O F F E R S

## Acorn User's Assembler Extension ROM at only £19.95

The *Acorn User Assembler Extension ROM (AXR)* is an exciting new *Acorn User* product aimed at the machine code programmer. It is compatible with Basic versions 1 and 2 – a Master compatible version is in the pipeline – and it costs just £19.95.

The *AXR* extends the Basic assembler to allow a variety of assembly options and commands. Just some of the new facilities are outlined below.

The *OPT* command controls the way in which the assembler operates. *AXR* provides extensions of these as follows:

- Bit 0 to 2 – Usual *OPT* functions
- Bit 3 set – Write to file and RAM
- Bit 4 set – Write to file only
- Bit 5 set – Branch to Jump
- Bit 6 set – Enhanced error reporting
- Bit 7 set – Flag duplicate labels

Write to file and RAM: normally object code is assembled to memory, with this option set the assembling machine code can be written directly to a file on disc or tape.

Write to file only: Works as above but the assembly to RAM is inhibited.

Branch to jump stops the 'out of range' error being generated by intelligently substituting a reverse branch instruction and *JMP*.

Enhanced error reporting will provide an enhanced error message and print a small arrow below the offending instruction should any errors occur.

The *AXR* adds several new pseudo op codes to the assembler. These are:

*ORG* – sets the origin for assembly, this is similar in action to assigning *P%* with the assembly start address.

*DST* – Specify destination, allows offset assembly in a similar manner to Basic 2's *O%* when used with *OPT 4 TO 7*.

*DFB* – Defines a byte, eg, *DFB 13,3,9* will

assemble the numbers 13, 3 and 9 into object code.

● *DFW* – Define word, assembles a two-byte value into the object code.

● *DFD* – Define Double Word, assembles a four-byte value into the object code.

● *DFR* – Define Real, assembles a real number into the object code.

● *DFS* – Define string, assembles an ASCII string into the object code.

● *SWR* – Set the Sideways RAM number – this allows code to be assembled directly to sideways RAM provided your RAM board allows this to happen.

*AXR* allows you to use procedures to implement **macros** in a very versatile way, thus large complicated programs can be built up simply by using a library of macro procedures.

The *\*ASSM* command allows files to be assembled from disc, assembly programs may then be created using a wordprocessor such as *Wordwise* or *View*. Other *\*commands* include *\*BITS* (*OPT help*), *\*LVAR* (prints values of all currently defined variables), *\*DSM* (disassembler), and *\*STRIP* (remove line numbers from a program).

The *AXR* supports the extra 65C02 instruction set and will allow these to be assembled correctly. The machine code can then be run on a 65C02-based processor.

Binary numbers may be used in assembler by prefixing the value by a *%*, ie *LDA # %11110001*. The use of '[' and ']' to enclose assembler statements is now a matter of choice – assembler and Basic can be mixed freely, ie: *100 IF byte% < 255 THEN LDA #byte:RTS* is allowed by *AXR*.

Our best-selling printer control ROM – *UserDump* and your favourite *UserROM* are still available, competitively priced at £19.95. See the order form on page 130.

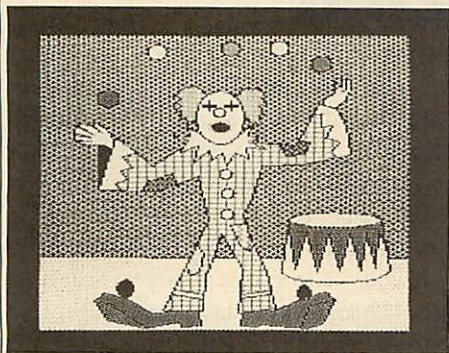
Telephone Orders 01-836 2441 9.30am to 5.00pm. Ask for Seran – Order form on page 130



# PROGRAM LISTINGS

**A C O R N U S E R O F F E R S**

## October listings on cassette £3.95 or disc £5.95



The Mode Conversion program

The Mode Conversion program and *Spider* programs dominate the cassette and disc offerings this month, plus as an added bonus to disc users of *View* we include the latest in *View* printer drivers.

Phil Wilkes produced this month's graphic bonus which was featured as part of the opening ceremony for the Master Compact on this month's cover. It's on both cassette and disc.

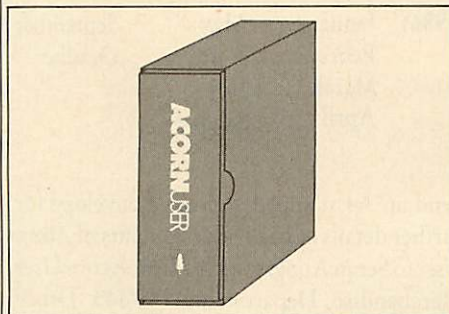
Dr Hock's View Printer Generator allows up to 31 short, 15 standard or seven long high-light codes to be entered.

The manual is in *View* format and can be dumped to your printer.

All the programs presented in this issue are on both disc and cassette. The disc is fully menu driven and a worthwhile investment at £5.95. Electron owners – remember the disc is fully compatible with the Advanced Plus 4 disc interface with 5.25 in drives.

The cassette contains versions of the programs for both BBC micros and Electron and includes a tape to disc transfer program – all for just £3.95! See order form on page 129.

## Free disc binder – yours when you subscribe to our monthly listings disc



The disc binder is yours when you subscribe

This month we're offering you the chance to receive our superb quality disc binder worth £9.95 when you subscribe to our monthly listings disc. The binder, made up in grey cloth, includes six transparent inserts each capable of holding two 5.25 in discs and a protective slip case.

Send your remittance of £69 while this offer lasts. Overseas readers should add £7 for surface mail (and airmail to Europe), or £15 for airmail delivery (to the rest of the world).

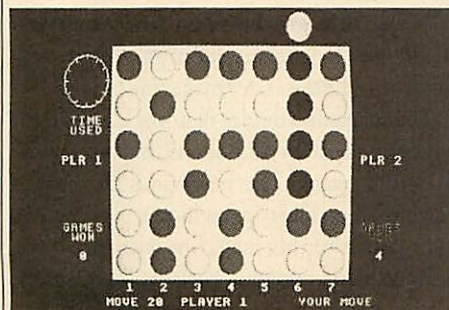
The discs contain all the program listings presented in each issue of *Acorn User*, so you don't have to type in the listings from the yellow pages – which saves you time, as well as money. Just load the disc and off you go.

Plus there's an added bonus – each month the discs contain exciting graphics screens, including some featured in the magazine.

Back issues of the monthly disc are available from October 1985.

Turn to page 129 for your order form.

## Subscribe to our cassette listings and receive our games cassette – free



Quadline from the Games Compendium

We are pleased to offer you our new *Acorn User Games Compendium* cassette, free, when you subscribe to our monthly cassette listings, regularly delivered each month to your door, for £45.

Our listings cassettes will save you the time and trouble of keying in our monthly listings from the yellow pages, leaving you free to get on and enjoy the programs.

The *Games Compendium* features some really great entertainment for BBC micro,

Master and Electron owners. It includes old favourites such as *Spectromania*, *Quadline*, *Picture Slide* and *3-D Maze*. Sample the delights of the *Acorn User* office in an adventure. Go collecting apples in *Shuggy's Garden*, or be all at sea in, *Run Silent, Run Deep*.

As a special bonus for BBC micro and Master owners try Rob Anderson's adventure with scrolling graphics – never published before in *AU*. All programs can be transferred to disc automatically. Order form on page 129.

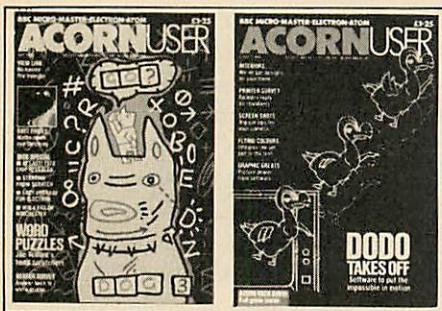
Telephone Orders 01-836 2441 9.30am to 5.00pm. Ask for Seran – Order form on page 129



# MAGAZINES & BINDERS

## ACORN USER OFFERS

### Three issues free – when you subscribe to Acorn User magazine



15 magazines for the price of 12

If you've enjoyed reading this issue of *Acorn User*, the biggest and best-selling BBC/Acorn magazine, why not ensure you receive your monthly copy regularly by subscription?

At the same time you'll be able to take advantage of our super special offer, and receive 15 issues of *Acorn User* magazine for the price of 12 – only £17.50.

How else can you make sure you are up-to-date with the latest innovations, news, reviews and features. Stay in touch each month with

*Acorn User* magazine, the biggest and the best!

You'll find articles covering education, business and home use, and there's a special section for new users. There are articles, hints and listings for all Acorn machines. This offer is only open to readers in the UK and the Republic of Ireland. Order form page 52.

If you are an overseas subscriber turn to page 129, so that you can take advantage of our two-year rate offer. We will send you 27 issues for the price of 24.

### Acorn User Magazine Back Issues – £1.75



Classic issues from yesteryear

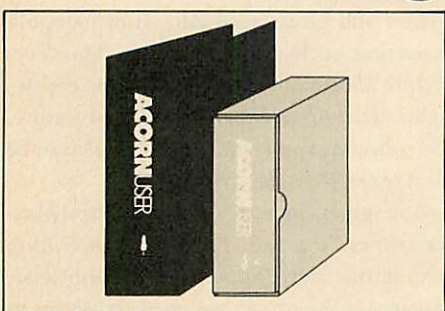
The following back issues are available by using the order form on page 130

1984:	May	August	November
	June	September	December
	July	October	
1985:	January	June	October
	March	July	November
	April	August	
	May	September	

1986:	January	May	September
	February	June	October
	March	July	
	April	August	

Send an A4 stamped addressed envelope for further details of back issue contents of *Acorn User* to Seran Anderson Haddick, Acorn User Merchandise Department, 141-143 Drury Lane, London WC2B 5TF.

### Disc Binder and Slip Case £9.95 and Magazine Binder £4.95



Magazine binder and disc binder

What better way to protect your *Acorn User* monthly disc listings, or your own programs, than in the safety of this fine grey cloth disc binder? The binder is lined in grey, and has a 30mm capacity, big enough to hold 12 monthly discs comfortably. The spine of the binder features a discreet silver *Acorn User* logo.

Included with the disc binder are six transparent inserts, each capable of holding two 5¼" discs. Last, but most importantly, there is a sturdy slip case for protection.

Never lose another issue and keep your *Acorn User* magazine collection in style, with this fine red *Acorn User* magazine binder.

The magazine binder features a wide spine with the capacity to hold 12 issues of more than 200 pages. The magazines are held in place with metal strips, which will allow you to fit your monthly magazine with ease.

Keep your precious back issues in safety, filed in order so that you can easily refer to them. The order form is on page 130.

Telephone Orders 01-836 2441 9.30am to 5.00pm. Ask for Seran – Order form on page 130



# SPECIAL PROGRAMS

ACORN USER OFFERS

## Acorn User Gallery Disc – super graphics for only £6.95



Malcolm Banthorpe's life-like Coke can

The *Acorn User Gallery* disc has proved to be immensely popular since its introduction in August. It features an automatic scrolling display of over 20 stunning graphic screens.

What's more, the disc gives you the chance to dabble with a little creativity, by using the *Super Painter* and *Pixel Editor*.

These clever graphics creating programs, included on the disc, allow you to alter and edit these pictures as you like, and also give you the chance to concoct your own designs.

You can marvel at Spiderman, see the Coke can come alive, plus *Robotic Brilliance*, *Astronaut*, *Elite*, *Wimp Fashion*, *Max Headroom*, *Sunrise*, *Thomas the Tank Engine*, and many more screens.

And don't forget you can use our *User-Dump* ROM to print all these screens too!

The Gallery disc is available as a single 80-track disc or two 40-track discs containing over 400k of graphics, costing just £6.95. Order form on page 129.

## New this month! Acorn User's Games Compendium Cassette – £3.95



Spectromania: compendium blockbuster

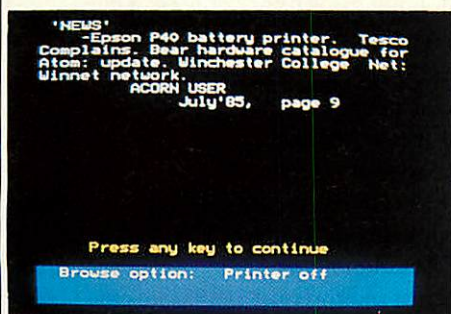
The *Acorn User Games Compendium* brings the best games published in *AU* over the past two years to BBC micro, Master and Electron owners. Included are David Acton's blockbuster *Spectromania* and the popular *Quadline* – see if you can get four in a row! Puzzle fanatics will get great enjoyment from our *Picture Slide* game while many will be amazed at Dave Lawrence's *3-D Maze*. Adventurers can sample the delights of the *Acorn User* office. Autumn's coming, so why not go col-

lecting apples in *Shuggy's Garden*, or be all at sea in *Run Silent, Run Deep*?

As a special bonus for BBC micro and Master owners, there is Rob Anderson's adventure with scrolling graphics – never published in *AU*. All programs can be transferred to disc automatically if desired.

You'll still find the *Best of Acorn User* and the *Graphics* cassettes available – see the order form on page 130. Each of our special cassettes is keenly priced at £3.95.

## Acorn User bibliography on disc – from £7.95



A page from Bibliography

If you've ever spent hours looking through your copies of *Acorn User* for an elusive article, which you know you've seen but can't remember when or where, then what you need is the *Acorn User* bibliography!

Our bibliography contains information on where to find games, listings, educational and utility programs; reviews of hardware, firmware, peripherals, software and books; and feature articles of specific and general interest. You'll even find reference to readers'

letters! The *Acorn User* bibliography is sold in parts, in a specially enhanced format, which will make your searches even faster, taking about 15 seconds on the 40-track and 40 seconds on the 80-track disc. Location of a reference is by one- or two-string searching and the user may specify the starting month and year. Output may be to screen or printed.

There are three parts currently available; part 4, will be released later in the year. Order form on page 129.

Telephone Orders 01-836 2441 9.30am to 5.00pm. Ask for Seran – Order form on page 129



# SPECIAL PROGRAMS

A C O R N U S E R O F F E R S

## Get out of trouble with the Disc Help Disc – only £6.95

Using discs & disc drives with  
your BBC Micro

### MENU

- A. What are discs & disc drives?
- B. Saving & loading BASIC programs
- C. Catalogues, Directories & Libraries
- D. Copying files & whole discs
- E. Deleting files & stopping accidental deletion
- F. All about auto-booting discs
- G. All sorts of odd commands
- H. Transferring BASIC programs from cassette to disc
- I. Test on the DFS
- J. About NAMEBUG

Press A-J to run the program you want  
(ESCAPE brings you back to this Menu)

The Disc Help Disc's menu page

Have you just bought a disc interface or disc drive? Do you have a disc interface and drive but are bamboozled by all the jargon? Do you simply want to know all about discs and how to use your Disc Filing System ROM to its full potential?

If you answer yes to any of these questions then *Acorn User* has the answer in the form of the *Disc Help Disc*, specially developed for the magazine by the North and Mid-Essex BBC Users Group.

Simply insert the *Disc Help Disc* into your drive and, once run, all the information you will ever need is at your finger tips. All aspects of file maintenance are covered and included is a Disc Filing System simulator to allow you to practise use of the commands.

A 'question and answer' tutorial at the end of each section ensures that you are able to evaluate your own knowledge. The disc is in 80-track format only. Order using the form on page 129.

## Wise up with the Education Disc at just £7.95



Eco-Fax is one of the disc's programs

The *Education Disc* contains programs drawn from past issues of *Acorn User* magazine.

*Eco-Fax* is a sophisticated viewdata-type database for use on Econet systems, and comes with its own versatile frame editor. There is a colourful version of *Turtle Logo*; a program which shows equations as graphs; and a music writing program which allows you to edit tunes.

Graphics are a strong feature of the collection, which includes the *Easyplot* drawing

software, supported by two other programs which use *Easyplot* screens as an electronic noticeboard or in place of an overhead projector. There is a bulletin board that displays a message in huge scrolling characters.

There are routines to use in your own Basic programs – screen dumps, a machine code utility which forces text input to upper case, and graphics plotting and drawing commands in mode 7. Plus a program to transfer files from tape to disc. Order form on page 129.

## Network Utility Disc only £19.95

### Acorn User

#### Network Utilities

The Acorn User Network Utilities fall into four categories. The following pages contain instructions on using the utilities.

User Utilities (Basic).....	951
User Utilities (Network).....	952
Manager Utilities.....	953
Demonstration Programs.....	954

For details about how to use NetFax refer to page 960

Bring teletext information to networks

The *Acorn User Network Utility Disc* is the logical addition to your network, combining a wide range of invaluable routines with a sophisticated, yet easy-to-use teletext information system. The disc features:

- NetFax – our hybrid information system. NetFax can provide thousands of pages of information which may be read without affecting any text or program in memory. It features an advanced teletext editor.
- Utilities for all network users, including a

file locator and directory size finder.

- Utilities for network managers, including a bridge-compatible screen viewer and an efficient 'notify-all' facility.
- An auto-installer to transfer all of our utilities to your net painlessly.
- 150 NetFax pages, including instructions, help pages and sample indexes.

The *Acorn User Utility* disc is in 80-track format and costs just £19.95. See page 129 for your order form.

Telephone Orders 01-836 2441 9.30am to 5.00 pm. Ask for Seran. Order form on page 129



# YELLOW PAGES

## INDEX / COMPATIBILITY

### Entering listings

To make the task of entering listings easier, *Acorn User* has adopted several standards in the Yellow Pages. Programs are listed with line numbers in increments of 10, so type AUTO <Return> for automatic line numbering before you start. Before you list what you've entered, type LISTO 1 <Return> to provide spaces after the line numbers. Programs in the Yellow Pages are often listed to a width of 40 characters, so type MODE 6 <Return> before you start. Comparing the line-endings of your listing with the Yellow Pages will help you spot extra or missing characters.

To make sure that the program you want to enter will work on your particular machine, check the index below. All the listings work with Basic 1, 2 and 4 (unless stated otherwise) and with operating system OS1.2 or above. If a program is accompanied by an article, please read the article first. If special care is needed when entering a listing, we provide a 'How to Enter' box.

Once you've typed in your program, save it to tape or disc then test it by running it. If you've made a mistake, an error message will probably appear, telling you which line contains the error.

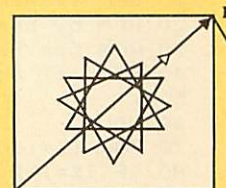
List the line and check it carefully against the published version.

If the line is the start of a procedure definition – eg, 1000 DEF PROCfred – the error may be a line which calls the procedure.

### TURTLE GRAPHICS GROWS UP

115

Joe Telford extends Logotron's turtle graphics capabilities using the Master or the Graphics Extension ROM on page 81



### ART TO ART CONVERSION

117

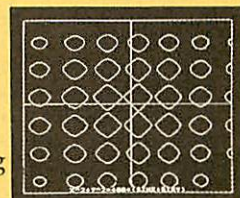
Converting graphics screens from one mode to another is easy, with Phil Wilkes' program. See page 88.



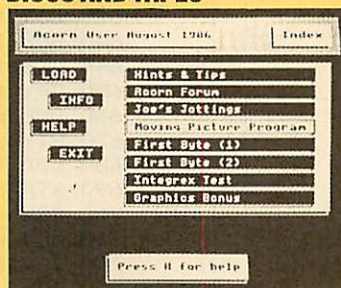
### SPIDER POWER

119

David Johnson-Davis and David Deutsch's a curve-plotting program that can plot almost any equation on page 93.



### DISCS AND TAPES



All the listings on these pages can be found on this month's listings disc or cassette. See page 109 for details.

### BACK ISSUES



For help with entering and debugging listings see the following back issues: April '86, June '85, Aug '84 and Sept '83.

Program	Page	BBC B	BBC B+/ 128k	BBC with ADFS	Shadow RAM	Electron	Electron with Plus 1	Electron with Plus 1 & Plus 3	Master 128	Master 128 + ADFS	Master Compact	6502SP	Econet	Monthly cassette & disc
Hints & Tips	Listing 1	114	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
First Byte	Listing 9	114	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Joe's Jottings	Listing 1	115	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(b)
Mode Conversion	Listing 1	117	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y
	Listing 2	118	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y
	Listing 3	118	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y
Spider	Listing 1	119	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 2	119	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SRAM Errors	Listing 1	121	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(a)
	Listing 2	122	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(a)
Econet Utilities	Listing 1	123	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 2	124	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 3	124	N	N	N	Y	N	N	N	Y	Y	Y	Y	Y
	Listing 4	125	N	N	N	Y	N	N	N	Y	Y	Y	Y	Y
	Listing 5	126	N	N	N	Y	N	N	N	Y	Y	Y	Y	Y
Top of the List	Listing 1	126	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y
	Listing 2	127	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y

(a) Needs sideways RAM

(b) Needs Logotron Logo (and G×R if possible)



# YELLOW PAGES

## H I N T S & T I P S

See Hints & Tips, page 49

### Listing 1. Prints out teletext characters

```

10 REM Teletext characters on printer
20 REM by Edmundo Herrero
30 REM for BBC B/B+/M/E
40 REM (c) Acorn User October 1986
50 :
60 VDU 2
70 FOR T%=160 TO 255
80 IF T%=192 THEN T%=224
90 PRINT "Character ";T%;" ";
100 PROCteletext(T%)
110 NEXT T%
120 VDU 3
130 END
140 :
150 DEF PROCteletext(N%)
160 IF N%<160 OR N%>255 THEN ENDPROC
170 IF N%>191 AND N%<224 THEN ENDPROC
180 N%=N%-160
190 f=N% DIV 64:N%=N% MOD 64
200 e=N% DIV 16:N%=N% MOD 16
210 d=N% DIV 8:N%=N% MOD 8
220 c=N% DIV 4:N%=N% MOD 4
230 b=N% DIV 2:a=N% MOD 2
240 g=7*e+24*c+224*a
250 h=7*f+24*d+224*b
260 VDU 1,27,1,75,1,6,1,0
270 VDU 1,g,1,g,1,g
280 VDU 1,h,1,h,1,h
290 ENDPROC

```

See First Byte, page 55

### Listing 9. Proportional Spacing Routine

```

10 REM First Byte listing 9
20 REM Proportional Spacing Routine
30 REM by Tessie Revivis
40 REM for BBC B/B+/M/E
50 REM (c) Acorn User October 1986
60 :
70 MODE 4
80 VDU 19,0,4,0,0,0
90 PROCinit
100 PROCass
110 PROCchecksum
120 PROCTest
130 END
140 :
150 DEF PROCinit
160 code%=&3000:mess%=&2F00
170 oswrch=&FFEE:osword=&FFF1
180 char=&70:count=&71
190 block%=&73
200 work%=&7C
210 ENDPROC
220 :
230 DEF PROCass
240 FOR pass%=0 TO 3 STEP 3
250 P%=code%
260 IOPT pass%
270 .start
280 LDA #0
290 STA char
300 .charloop
310 LDX char
320 LDA mess%,X

```

Continued ►

### ◀ Continued

```

330 CMP #13
340 BNE notlastchar
350 RTS
360 :
370 .notlastchar
380 CMP #32
390 BNE notspace
400 LDA #12
410 STA plotpars+2
420 LDA #0
430 STA plotpars+3
440 JSR doplot
450 BEQ nextchar
460 :
470 .notspace
480 STA block%
490 LDX #block% MOD 256
500 LDY #block% DIV 256
510 LDA #&A
520 JSR osword
530 JSR copy
540 .leftloop1
550 LDX #7
560 .leftloop2
570 ASL work%,X
580 BCS leftbitfound
590 DEX
600 BPL leftloop2
610 INY
620 CPY #8
630 BNE leftloop1
640 .leftbitfound
650 CPY #0
660 BNE nottoowide
670 STY plotpars+3
680 LDA #4
690 STA plotpars+2
700 JSR doplot
710 BEQ noleft
720 .nottoowide
730 DEY
740 JSR sub
750 .noleft
760 LDA block%
770 JSR oswrch
780 JSR copy
790 .rightloop1
800 LDX #7
810 .rightloop2
820 LSR work%,X
830 BCS rightbitfound
840 DEX
850 BPL rightloop2
860 INY
870 CPY #8
880 BNE rightloop1
890 .rightbitfound
900 JSR sub
910 .nextchar
920 INC char
930 BNE charloop
940 :
950 .copy
960 LDY #8
970 .copyloop
980 LDA block%,Y
990 STA work%-1,Y
1000 DEY

```

Continued ►



# YELLOW PAGES

## JOE'S JOTTINGS

### ◀ Listing 9 continued

```

1010 BNE copyloop
1020 RTS
1030 :
1040 .sub
1050 TYA
1060 ASL A
1070 ASL A
1080 BEQ noplot
1090 STA count
1100 LDA #0
1110 SEC
1120 SBC count
1130 STA plotpars+2
1140 LDA #0
1150 SBC #0
1160 STA plotpars+3
1170 :
1180 .doplot
1190 LDX #0
1200 .doplotloop
1210 LDA plotpars,X
1220 JSR oswrch
1230 INX
1240 CPX #6
1250 BNE doplotloop
1260 .noplot
1270 RTS
1280 :
1290 .plotpars
1300 OPT FNequb(25)
1310 OPT FNequb(0)
1320 OPT FNequw(0)
1330 OPT FNequw(0)
1340 .endofcode
1350 JNEXT pass%
1360 ENDPROC
1370 :
1380 DEF PROCchecksum
1390 total%=0
1400 FOR byte%=code% TO endofcode
1410 total%=total%+?byte%
1420 NEXT byte%
1430 IF total%<>18672 PRINT"checksum error
in assembler.":VDU7:END
1440 ENDPROC
1450 :
1460 DEF PROCtest
1470 VDU 12,5
1480 T%=1000
1490 REPEAT
1500 MOVE 40,T%
1510 READ text$
1520 IF text$<>"" PROCprop(text$)
1530 T%=T%-40
1540 UNTIL text$=""
1550 MOVE 40,T%
1560 PROCprop("(Code size : "+STR$(P%-code%)+
"bytes)")
1570 VDU 4
1580 ENDPROC
1590 :
1600 DEF PROCprop($mess%)
1610 CALL start
1620 ENDPROC
1630 :
1640 DEF FNequb(byte%)
1650 ?P%=byte%
1660 P%=P%+1

```

Continued ▶

### ◀ Continued

```

1670 =pass%
1680 :
1690 DEF FNequw(word%)
1700 ?P%=word% MOD 256
1710 P%?1=word% DIV 256
1720 P%=P%+2
1730 =pass%
1740 :
1750 DATA "This is a demonstration of p
roportional printing"
1760 DATA "on the BBC Micro, Master and
Electron computers."
1770 DATA "Note that more than 40 colum
ns of text may be"
1780 DATA "displayed on a mode 4 screen
."
1790 DATA " "
1800 DATA "The full character set is av
ailable:"
1810 DATA " "
1820 DATA "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
1830 DATA " "
1840 DATA "abcdefghijklmnopqrstuvwxyz"
1850 DATA " "
1860 DATA "0123456789"
1870 DATA " "
1880 DATA "!\"#$%&'()*=-~^!\"_{'@+;*:}]?
/><"
1890 DATA " "
1900 DATA ""

```

### How to enter the Logo program

*The line numbers in the listing are for your reference only – do not type them into Logo*

### See Turtle Graphics Grows Up, page 81

#### Listing 1. The Logo program

```

1 TO PICTURE
2 COLOURS GROUND SKY CLOUD
3 TREE HOUSE PATH SUN
4 END
5
6 TO COLOURS
7 SETPAL 2 2
8 SETPAL 3 6
9 MIX 1 1 2
10 MIX 2 1 3
11 MIX 3 0 2
12 MIX 4 0 3
13 END
14
15 TO GROUND
16 LT 90 PU FD 638 LT 90 FD 380
17 .SETNIB 101 SETPC 2 SETPOS [636 8]
18 PU HOME
19 END
20
21 TO SKY
22 HT GCOL 64 0 PAINT

```

Continued ▶



# YELLOW PAGES

## GRAPHICS

### ◀ Joe's listing 1 continued

```

23 FD 0 REPEAT 23 [FD 16]
24 PU HOME
25 END
26
27 TO CLOUD
28 PU HOME
29 SETPOS [-300 270]
30 LT 90 FD 250
31 .SETNIB 205
32 HT GCOL 32 0
33 SETPOS [-300 380]
34 PU HOME
35 END
36
37 TO TREE
38 PU SETPOS [-400 -320]
39 .SETNIB 101
40 HT GCOL 16 0
41 SETPOS [-350 200]
42 PU SETH 0 LT 90 FD 25 LT 90
43 LEAVES
44 END
45
46 TO HOUSE
47 WALLS ROOF DOOR WINDY
48 END
49
50 TO PATH
51 PUSSETPOS [400 -200]
52 SETPC 0 LT 135 FD 250
53 RT 45 .SETNIB 117 FD 110
54 END
55
56 TO SUN
57 PU HOMESSETPOS [500 250]
58 HT GCOL 16 0
59 .SETNIB 157 FD 50
60 PU HOME
61 END
62
63 TO SETPAL :logical :actual
64 VDU ( SE [19] :logical :actual
    [0 0 0 0 0] )
65 END
66
67 TO PAINT
68 .SETNIB 133
69 FD 0
70 END
71
72 TO LEAVES
73 FD 0
74 .SETNIB 157
75 HT GCOL 48 0
76 FD 200
77 PU HOME
78 END
79
80 TO WALLS
81 BK 200
82 .SETNIB 101
83 SETPC 1
84 SETPOS [500 100]
85 PU
86 END
87
88 TO ROOF
89 MIX 3 0 1 HT GCOL 48 0

```

Continued ▶

### ◀ Continued

```

90 FD 0 FD 0 .SETNIB 85
91 LT 45 FD 80
92 LT 45 FD 388
93 LT 45 FD 80
94 LT 135 FD 500 LT 90
95 END
96
97 TO GCOL :mode :col
98 VDU ( SE [18] :mode :col )
99 END
100
101 TO MIX :pat :c1 :c2
102 VDU ( SE [23] 11 + :pat :c1 :c2 :
    c2 :c1 :c1 :c2 :c2 :c1 )
103 END
104
105 TO DOOR
106 MIX 3 2 3 PU
107 BK 300 LT 90 FD 200
108 RT 90 .SETNIB 101
109 GCOL 48 0 SETPOS [400 50]
110 END
111
112 TO WINDY
113 PU LT 90 FD 150 LT 45
114 .SETNIB 101 SETPC 3
115 FD 200 PU HOME
116 END

```

See Art to Art Conversion, page 88

### How to enter the mode convertor

The demo program converts a mode 2 screen to mode 1 then to Mode 0. If you have a mode 2 picture of your own then change lines 80, 110 and 150 of 'DEMO' to \*LOAD your screen.

If you do not have a mode 2 screen, then enter and run 'DEMOPIC'. This draws a simple mode 2 screen and saves it as 'TESTPIC'. If you do this, no changes will be necessary in the demo program.

You can use this month's graphics bonus 'RIBBON' on the listings disc and cassette to try converting a mode 1 screen to mode 0. However it will need decompacting. This can be done by entering the following program:

```

10 *LDPIC RIBBON
20 VDU 7:key=GET
30 *SAVE PICTURE 3000+5000

```

To see the conversion, delete lines 70 to 160 and instead enter the following:

```

70 MODE 1:REM set original mode
80 *LOAD PICTURE
90 get%=GET
100 MODE 0:REM set new mode
110 *LOAD PICTURE
120 PROC convert10
130 END

```



# YELLOW PAGES

## G R A P H I C S

### Listing 1. Source code for Mode Converter

```

10 REM Mode Converter listing 1
20 REM by Phil Wilkes
30 REM for B/B+/M/E
40 REM (c) Acorn User October 1986
50 :
60 MODE 4
70 PROCtables
80 PROCcode
90 PROCchecksum
100 PROCsave
110 END
120 :
130 DEF PROCtables
140 even10%=&1600
150 even20%=&1800
160 even21%=&1880
170 odd10%=&1700
180 odd20%=&1840
190 odd21%=&18C0
200 pointer%=&70
210 PRINTTAB(0,10)"Please wait - creat
ing conversion tables"
220 mask%=&88
230 FOR screen%=0 TO 255
240 S%=screen%
250 D%=0
260 E%=0
270 FOR pix%=0 TO 3
280 C%=S% AND mask%
290 IF C%=136 THEN D%=D%+3:E%=E%+3
300 IF C%=128 AND (pix% MOD 2)=1 THEN
D%=D%+1:E%=E%+3
310 IF C%=128 AND (pix% MOD 2)=0 THEN
D%=D%+3:E%=E%+1
320 IF C%=8 THEN D%=D%+1:E%=E%+2
330 IF pix%<3 THEN S%=S%*2:D%=D%*4:E%=
E%*4
340 NEXT pix%
350 even10%?screen%=E%
360 odd10%?screen%=D%
370 NEXT screen%
380 mask%=42
390 FOR screen%=0 TO 63
400 S%=screen%
410 D%=0
420 E%=0
430 FOR pix%=0 TO 1
440 C%=S% AND mask%
450 IF C%=42 THEN D%=D%+15:E%=E%+15
460 IF C%=10 THEN D%=D%+7:E%=E%+15
470 IF C%=40 THEN D%=D%+7:E%=E%+13
480 IF C%=8 THEN D%=D%+7:E%=E%+13
490 IF C%=34 THEN D%=D%+10:E%=E%+5
500 IF C%=2 THEN D%=D%+10:E%=E%+5
510 IF C%=32 THEN D%=D%+8:E%=E%+2
520 IF pix%=0 THEN S%=S%*2:E%=E%*16:D%
=D%*16
530 NEXT pix%
540 even20%?screen%=E%
550 odd20%?screen%=D%
560 NEXT screen%
570 FOR screen%=0 TO 63
580 S%=screen%
590 D%=0
600 E%=0
610 FOR pix%=0 TO 1
620 C%=S% AND mask%
630 IF C%=42 THEN D%=D%+51:E%=E%+51

```

Continued ►

◀ Continued

```

640 IF C%=10 THEN D%=D%+49:E%=E%+50
650 IF C%=40 THEN D%=D%+48:E%=E%+48
660 IF C%=8 THEN D%=D%+16:E%=E%+32
670 IF C%=34 THEN D%=D%+18:E%=E%+33
680 IF C%=2 THEN D%=D%+3:E%=E%+3
690 IF C%=32 THEN D%=D%+1:E%=E%+2
700 IF pix%=0 THEN S%=S%*2:E%=E%*4:D%=
D%*4
710 NEXT pix%
720 even21%?screen%=E%
730 odd21%?screen%=D%
740 NEXT screen%
750 ENDPROC
760 :
770 DEF PROCcode
780 P%=&1500
790 [
800 .ch10
810 LDA #0
820 STA pointer%
830 TAX
840 LDA #&30
850 STA pointer%+1
860 .loop
870 LDA (pointer%,X)
880 TAY
890 LDA even10%,Y
900 STA (pointer%,X)
910 INC pointer%
920 LDA (pointer%,X)
930 TAY
940 LDA odd10%,Y
950 STA (pointer%,X)
960 INC pointer%
970 BNE loop
980 INC pointer%+1
990 BPL loop
1000 RTS
1010 .ch20
1020 LDA #0
1030 STA pointer%
1040 TAX
1050 LDA #&30
1060 STA pointer%+1
1070 .loop2
1080 LDA (pointer%,X)
1090 AND #63
1100 TAY
1110 LDA even20%,Y
1120 STA (pointer%,X)
1130 INC pointer%
1140 LDA (pointer%,X)
1150 AND #63
1160 TAY
1170 LDA odd20%,Y
1180 STA (pointer%,X)
1190 INC pointer%
1200 BNE loop2
1210 INC pointer%+1
1220 BPL loop2
1230 RTS
1240 .ch21
1250 LDA #0
1260 STA pointer%
1270 TAX
1280 LDA #&30
1290 STA pointer%+1

```

Continued ►



# YELLOW PAGES

## GRAPHICS

### ◀ Wilkes' listing 1 continued

```

1300 .loop1
1310 LDA (pointer%,X)
1320 AND #63
1330 TAY
1340 LDA even21%,Y
1350 STA (pointer%,X)
1360 INC pointer%
1370 LDA (pointer%,X)
1380 AND #63
1390 TAY
1400 LDA odd21%,Y
1410 STA (pointer%,X)
1420 INC pointer%
1430 BNE loop1
1440 INC pointer%+1
1450 BPL loop1
1460 RTS
1470 J
1480 ENDPROC
1490 :
1500 DEF PROCchecksum
1510 total%=0
1520 FOR i%=&1500 TO P%-1
1530 total%=total%+?i%
1540 NEXT i%
1550 IF total%<>14701 PRINT"Checksum error in assembler.":VDU7:END
1560 total%=0
1570 FOR i%=&1600 TO &18FF
1580 total%=total%+?i%
1590 NEXT i%
1600 IF total%<>104872 PRINT"Checksum error in tables.":VDU7:END
1610 ENDPROC
1620 :
1630 DEF PROCsave
1640 *SAVE CONVERT 1500 1900
1650 ENDPROC

```

### Listing 2. Demonstration of Mode Converter

```

10 REM Mode Converter listing 2
20 REM by Phil Wilkes
30 REM B/B+/M/E
40 REM (c) Acorn User October 1986
50 :
60 PROCinit
70 MODE2:REM set original mode
80 *LOAD TESTPIC
90 get%=GET
100 MODE 1:REM set new mode
110 *LOAD TESTPIC
120 PROCconvert21
130 get%=GET
140 MODE 0:REM set new mode
150 *LOAD TESTPIC
160 PROCconvert20
170 END
180 :
190 DEF PROCinit
200 *LOAD CONVERT
210 ch10%=&1500
220 ch20%=&1524
230 ch21%=&154C
240 ENDPROC

```

Continued ▶

### ◀ Continued

```

250 :
260 DEF PROCconvert10
270 CALLch10%
280 ENDPROC
290 :
300 DEF PROCconvert20
310 CALLch20%
320 ENDPROC
330 :
340 DEF PROCconvert21
350 CALLch21%
360 ENDPROC

```

### Listing 3. Draws a demonstration Mode 2 screen

```

10 REM Mode Converter listing 3
20 REM by David Lawrence
30 REM B/B+/M/E
40 REM (c) Acorn User October 1986
50 :
60 MODE2
70 PROCdrawscreen
80 PROCsave
90 END
100 :
110 DEF PROCdrawscreen
120 VDU23;8202;0;0;0;0;
130 colour%=1
140 FOR ang%=0 TO 360 STEP 5
150 MOVE 640,512:GCOL 0,colour%
160 DRAW 640+1000*SINRAD(ang%),512+1000*
COSRAD(ang%)
170 colour%=colour%+1
180 IF colour%=8 colour%=1
190 NEXT
200 colour%=7
210 FOR rad%=500 TO 0 STEP -25
220 PROCcirc(640,512,rad%,colour%)
230 colour%=colour%-1
240 IF colour%<0 colour%=7
250 NEXT
260 PROCText(30,800,"Acorn",0)
270 PROCText(10,780,"Acorn",2)
280 PROCText(170,550,"User",0)
290 PROCText(150,530,"User",1)
300 ENDPROC
310 :
320 DEF PROCsave
330 *SAVE "TESTPIC" 3000+5000
340 ENDPROC
350 :
360 DEF PROCcirc(x%,y%,r%,col%)
370 MOVE x%,y%+r%:GCOL 0,col%
380 FOR ang%=0 TO 360 STEP 20
390 MOVE x%,y%
400 PLOT 85,x%+r%*SINRAD(ang%),y%+r%*
COSRAD(ang%)
410 NEXT
420 ENDPROC
430 :
440 DEF PROCText(x%,y%,a$,col%)
450 GCOL 0,col%:VDU 5
460 VDU23,128,240,240,240,0,0,0,0
470 FOR char%=1 TO LEN(a$)
480 ?&900=ASC(MID$(a$,char%,1))

```

Continued ▶



# YELLOW PAGES

## GRAPHICS

### ◀ Wilkes' listing 3 continued

```

490 X%=0:Y%=9:A%=&A:CALL &FFF1
500 FOR b%=1 TO 8:FOR c%=7 TO 0 STEP -
1
510 IF b%?&900 AND 2^c% MOVE x%+(char%
-1)*256+(7-c%)*32,y%+(9-b%)*16:VDU 128
520 NEXT:NEXT:VDU 4
530 ENDPROC

```

See Spider Power, page 93

### Listing 1. It uses EVAL to solve an equation

```

10 REM Equation Solver
20 REM using Newton's Method
30 REM by David Deutsch
40 REM and David Johnson-Davies
50 REM for BBC B/B+/M/E
60 REM (c) Acorn User October 1986
70 :
80 INPUT "Equation to solve for X: "g
$
90 E%=INSTR(g$,"=")
100 f$="("+LEFT$(g$,E%-1)+") - (" +MID$(
(g$,E%+1)+")"
110 INPUT "Estimated solution: X = "v
120 INPUT "Desired accuracy in X = "ac
curacy
130 :
140 GOTO 190:REM and return here
150 PRINT "Solution found near X = ";z
160 ON ERROR OFF
170 END
180 :
190 REM 'Subroutine' to find solution
200 oldX=v
210 a=accuracy/10
220 ON ERROR GOTO 320
230 X=v:fx=EVAL(f$)
240 X=v-a:fm=EVAL(f$)
250 X=v+a:fp=EVAL(f$)
260 IF fp=fm THEN a=2*a:GOTO240
270 newX=v-(fp+fm)*a/(fp-fm)
280 ON ERROR OFF
290 IF ABS(newX-v)<=accuracy THEN z=new
X:GOTO 150
300 oldX=v:v=newX:GOTO210
310 :
320 REM Error handler
330 IF ERR=17 THEN END
340 IF ERL<>190 THEN a=a/2:GOTO240
350 IF X=oldX THEN PRINT "Function unde
fined at given point":GOTO80
360 v=.5*(v+oldX):GOTO 230
370 a=a/2:GOTO240

```

### Listing 2. Graph drawing program using more than one variable

```

10 REM Spider Curve Drawing Program
20 REM by David Deutsch
30 REM and David Johnson-Davies
40 REM for BBC B/B+/M/E

```

Continued ▶

### ◀ Continued

```

50 REM (c) Acorn User October 1986
60 :
70 MODE 1:xpix=4:ypix=4:COLOUR 1
80 VDU 19,1,7;0::VDU 19,2,7;0::VDU
19,3,1;0;
90 point=69:line=5:@%=0
100 any_r=FALSE:any_t=FALSE
110 PRINT "Equation for the curve in te
rms of"
120 PRINT "any of the following"
130 PRINT "X = horizontal Cartesian coo
rdinate,"
140 PRINT "Y = vertical Cartesian coord
inate,"
150 PRINT "r = radial polar coordinate,"
"
160 PRINT "t = angular polar coordinate
,"
170 INPUT 'g$
180 E%=INSTR(g$,"=")
190 f$="("+LEFT$(g$,E%-1)+") - (" +MID$(
(g$,E%+1)+")"
200 :
210 PRINT "Position of window:"
220 INPUT "X-coordinate of left edge: "
1$
230 x1=EVAL(1$)
240 INPUT "X-coordinate of right edge:
"u$
250 xr=EVAL(u$)
260 INPUT "Y-coordinate of lower edge:
"l$
270 y1=EVAL(l$)
280 INPUT "Y-coordinate of upper edge:
"u$
290 yu=EVAL(u$)
300 xd=xr-x1:yd=yu-y1
310 :
320 REM axes at (0,0) or (x1,y1)
330 IF x1>0 OR xr<0 THEN xa=x1 ELSE xa
=0
340 IF y1>0 OR yu<0 THEN ya=y1 ELSE ya
=0
350 colour=1:REM curve
360 acolour=3:REM axes and dots
370 :
380 REM Polar Coordinates
390 any_r= INSTR(g$,"r")<>0
400 any_t= INSTR(g$,"t")<>0
410 l$="0":u$="0"
420 IF any_t PROCtrange
430 lowt=EVAL(1$)-0.1:hight=EVAL(u$)+0
.1
440 sheetsize=5
450 :
460 REM Scanning Increments
470 epsilon=0.1:xs=xd/8:ys=yd/6
480 arc=2
490 :
500 REM Start plotting
510 CLG
520 dy=epsilon*yd/256:dx=epsilon*xd/32
0
530 :
540 REM Scan Cells for Parts of the Cu
rve
550 xscan=x1+.5*xs

```

Continued ▶



# YELLOW PAGES

## GRAPHICS

### Johnson-Davies' listing 2 continued

```

560 IF any_t xscan=xscan+dx*(hight-low
t)/(2*PI)
570 yscan=y1+.5*ys
580 ns=20
590 X=xscan:Y=yscan
600 closer_ret=1:GOTO940
610 ON result GOTO 630,730,780
620 :
630 REM Plot Point on Curve and Move A
long it
640 style=point:plot_ret=1:GOTO 1140
650 style=line:xx=X:yy=Y:hits=0:sense=
1
660 follow_ret=1:GOTO 1240
670 X=xx:Y=yy:style=point:plot_ret=2:G
OTO 1140
680 style=line:hits=0:sense=-1
690 follow_ret=2:GOTO 1240
700 GOTO780
710 :
720 REM Look Harder for Curve
730 X%=FNx(X):Y%=FNy(Y)
740 GCOL 3,3: PLOT point,X%,Y%
750 IF ABS(X-xscan)>xs OR ABS(Y-yscan)
>ys THEN 780
760 IF ns>0 THEN ns=ns-1:GOTO600
770 :
780 IF NOT any_t OR yscan>0 OR yscan+y
s<0 THEN yscan=yscan+ys ELSE yscan=yscan
+ys/3
790 IF yscan<yu THEN 580
800 IF NOT any_t OR xscan>0 OR xscan+x
s<0 THEN xscan=xscan+xs ELSE xscan=xscan
+xs/3
810 IF xscan<xr THEN 570
820 colour=3-colour
830 lowt=lowt+sheetsize
840 IF lowt<hight THEN 540
850 :
860 REM Draw Axes and Finish
870 GCOL 3,acolor:MOVE FNx(xa),0
880 PLOT 1,0,1023:MOV 0,FNy(ya):PLOT
1,1279,0
890 IF LEN(g$)<38 PRINTTAB(20-LEN(g$)/
2,31);g$;
900 REPEAT:UNTIL INKEY(-99)
910 *SAVE PLOT FFFF3000+5000
920 END
930 :
940 REM 'Closer' - Go Closer to Curve.
950 REM result: 1=found curve, 2=not
found, 3=error
960 x=X:y=Y
970 result=3:ON ERROR IF ERR=17 THEN E
ND ELSE 1110
980 fx=FNeval(x,y)
990 IF fx=0 THEN result=1:GOTO1110
1000 f1=FNeval(x-dx,y)
1010 fr=FNeval(x+dx,y)
1020 fb=FNeval(x,y-dy)
1030 ft=FNeval(x,y+dy)
1040 IF ABS(SGN(fx)+SGN(f1)+SGN(fr)+SGN
(fb)+SGN(ft))<>5 result=1:GOTO1110
1050 IF ABS(fx)<.01*(ABS(f1)+ABS(fr)+AB
S(ft)+ABS(fb)) result=1:GOTO1110
1060 IF ABS(fr-fx)>ABS(f1-fx) THEN dfx=
(fr-fx)/dx ELSE dfx=(fx-f1)/dx
1070 IF ABS(ft-fx)>ABS(fb-fx) THEN dfy=
(ft-fx)/dy ELSE dfy=(fx-fb)/dy

```

Continued ►

### Continued

```

1080 q=fx/(dfx*dfx+dfy*dfy)
1090 X=x-q*dfx:Y=y-q*dfy
1100 IF ABS(FNeval(X,Y)) < ABS(fx) THEN
result=2
1110 ON ERROR OFF
1120 ON closer_ret GOTO 610,1330
1130 :
1140 REM 'Plot' - Plots Point or Line.
1150 REM result: 0=OK, 1=point already
there
1160 X%=FNx(X):Y%=FNy(Y):result=0
1170 FOR j=-1 TO 1:FOR k=-1 TO 1
1180 result=result-(POINT(X%+j*ypix,Y%+
k*ypix)=colour)
1190 NEXT:NEXT
1200 result=-(result>1)
1210 GCOL 0,colour:PLOT style,X%,Y%
1220 ON plot_ret GOTO 650,680,1380
1230 :
1240 REM 'Follow' - Follows Curve
1250 ON ERROR IF ERR=17 THEN END ELSE 1
400
1260 x=X:y=Y
1270 gx=FNeval(x,y+dy)-FNeval(x,y-dy)
1280 gy=FNeval(x-dx,y)-FNeval(x+dx,y)
1290 q=sense*SQR((gx/dx)*(gx/dx)+(gy/dy
)*(gy/dy))*epsilon/arc
1300 X=x-gx/q:Y=y-gy/q
1310 nn=20
1320 closer_ret=2:GOTO940
1330 IF result=1 THEN 1360
1340 nn=nn-1
1350 IF nn>0 THEN 1320 ELSE 1400
1360 IF X<x1 OR X>xr OR Y<y1 OR Y>yu TH
EN 1400
1370 plot_ret=3:GOTO1140
1380 style=line:hits=(hits+result)*resu
lt
1390 IF hits<=2 THEN 1260
1400 ON ERROR OFF
1410 ON follow_ret GOTO 670,700
1420 :
1430 REM Functions and Procedures
1440 :
1450 DEF FNeval(X,Y)
1460 LOCAL r,t
1470 IF any_r THEN r=SQR(X*X+Y*Y)
1480 IF NOT any_t THEN EVAL(f$)
1490 IF X=0 THEN t=PI-SGN(Y)*PI/2
1500 IF X<0 THEN t=ATN(Y/X)+PI
1510 IF X>0 THEN t=ATN(Y/X)-(Y<0)*2*PI
1520 t=t-2*PI*INT((t-lowt)/(2*PI))
1530 IF ABS(t-lowt-PI)>3 ERROR
1540 =EVAL(f$)
1550 :
1560 DEF FNx(x)=1280*(x-x1)/xd
1570 DEF FNy(y)=1024*(y-y1)/yd
1580 :
1590 DEF PROCtrange
1600 PRINT""Approximate range of the a
ngle t:""
1610 INPUT"Lower bound: "l$
1620 INPUT"Upper bound: "u$
1630 ENDPROC

```



# YELLOW PAGES

## U T I L I T I E S

See Trapping errors on the side, page 102

### Listing 1. Service ROM error example

```

10 REM Service ROM error example
20 REM by Steve Picton
30 REM for BBC B/B+/M/E
40 REM (c) Acorn User October 1986
50 :
60 resultlo=&70:resulthi=&71
70 F%=&3000
80 FOR pass=0 TO 3 STEP 3
90 P%=&5000
100 OPT pass
110 OPT FNequw(0)
120 OPT FNequb(0)
130 JMP service+F%
140 OPT FNequb(&82)
150 OPT FNequb(copy-&5000)
160 OPT FNequb(1)
170 :
180 .title
190 OPT FNequs("Error example")
200 OPT FNequb(0)
210 OPT FNequs("1.01")
220 :
230 .copy
240 OPT FNequb(0)
250 OPT FNequs("(C) S.Picton")
260 OPT FNequb(0)
270 :
280 .service
290 PHP
300 PHA
310 TXA
320 PHA
330 TYA
340 PHA
350 TSX
360 LDA &103,X
370 EOR #4
380 BEQ rcode4
390 :
400 .exit
410 PLA
420 TAY
430 PLA
440 TAX
450 PLA
460 PLP
470 RTS
480 :
490 .complete
500 TSX
510 LDA #0
520 STA &103,X
530 BEQ exit
540 :
550 .text
560 OPT FNequs("MOVE")
570 :
580 .rcode4
590 TAX
600 :
610 .loop
620 LDA (&F2),Y
630 AND #&DF
640 CMP text+F%,X
650 BNE exit
660 INY
670 INX
680 CPX #4

```

Continued ►

### ◀ Continued

```

690 BNE loop
700 LDA #0
710 STA resultlo
720 STA resulthi
730 JSR spaceloop
740 :
750 .nextchar
760 LDA (&F2),Y
770 CMP #13
780 BEQ complete
790 CMP #ASC" "
800 BEQ end
810 CMP #ASC"0"
820 BCC badnumber
830 CMP #&3A
840 BCC digit
850 CMP #ASC"A"
860 BCC badnumber
870 CMP #ASC"G"
880 BCS badnumber
890 SBC #&36
900 :
910 .digit
920 ASL A
930 ASL A
940 ASL A
950 ASL A
960 LDX #4
970 :
980 .roloop
990 ASL A
1000 ROL resultlo
1010 ROL resulthi
1020 BCS toobig
1030 DEX
1040 BNE roloop
1050 INY
1060 BNE nextchar
1070 :
1080 .end
1090 JSR spaceloop
1100 CMP #13
1110 BEQ complete
1120 LDX #0
1130 BEQ skip1
1140 :
1150 .badnumber
1160 LDX #badnum-start
1170 BNE skip1
1180 :
1190 .toobig
1200 LDX #size-start
1210 :
1220 .skip1
1230 LDY #0
1240 STY &100
1250 :
1260 .copyloop
1270 LDA start+F%,X
1280 STA &101,Y
1290 BEQ done
1300 INX
1310 INY
1320 BNE copyloop
1330 :
1340 .done
1350 JMP &100
1360 :

```

Continued ►



# YELLOW PAGES

## UTILITIES

### ◀ Picton's listing 1 continued

```

1370 .start
1380 OPT FNequb(16)
1390 OPT FNequs("Syntax error")
1400 OPT FNequb(0)
1410 :
1420 .size
1430 OPT FNequb(20)
1440 OPT FNequs("Too big")
1450 OPT FNequb(0)
1460 :
1470 .badnum
1480 OPT FNequb(28)
1490 OPT FNequs("Bad Hex")
1500 OPT FNequb(0)
1510 :
1520 .loop2
1530 INY
1540 :
1550 .spaceloop
1560 LDA (&F2),Y
1570 CMP#ASC" "
1580 BEQ loop2
1590 RTS
1600 :
1610 J
1620 NEXT pass
1630 sum=0
1640 FOR A%=&5000 TO P%-1
1650 sum=sum+A%:NEXT A%
1660 IF sum<>&5C65 THEN GOTO 1850
1670 END
1680 :
1690 DEF FNequb(N)
1700 ?P%=N
1710 P%=P%+1
1720 =pass
1730 :
1740 DEF FNequw(N)
1750 ?P%=N MOD 256
1760 ?(P%+1)=N DIV 256
1770 P%=P%+2
1780 =pass
1790 :
1800 DEF FNequs(N$)
1810 $P%=N$
1820 P%=P%+LEN(N$)
1830 =pass
1840 :
1850 VDU 7:PRINT "Check listing"

```

### Listing 2. Language ROM error example

```

10 REM Language ROM error example
20 REM by Steve Picton
30 REM for BBC B/B+/M/E
40 REM (c) Acorn User October 1986
50 :
60 osrdch=&FFE0:buffer=&3000
70 veclo=&202:vechi=&203
80 F%=&3000
90 FOR pass=0 TO 3 STEP 3
100 P%=&5000
110 [OPT pass
120 JMP language+F%

```

Continued ▶

### ◀ Continued

```

130 JMP service+F%
140 OPT FNequb(&C2)
150 OPT FNequb(copy-&5000)
160 OPT FNequb(2)
170 :
180 .title
190 OPT FNequs("Error example")
200 OPT FNequb(0)
210 OPT FNequs("1.02")
220 :
230 .copy
240 OPT FNequb(0)
250 OPT FNequs("(C) S.Picton")
260 OPT FNequb(0)
270 :
280 .service
290 PHP
300 PHA
310 TXA
320 PHA
330 TYA
340 PHA
350 TSX
360 LDA &103,X
370 EOR #4
380 BEQ rcode4
390 :
400 .exit
410 PLA
420 TAY
430 PLA
440 TAX
450 PLA
460 PLP
470 RTS
480 :
490 .text
500 OPT FNequs("ERROR")
510 .rcode4
520 TAX
530 .loop
540 LDA (&F2),Y
550 AND #&DF
560 CMP text+F%,X
570 BNE exit
580 INY
590 INX
600 CPX #5
610 BNE loop
620 LDX &F4
630 LDA #142
640 JMP &FFF4
650 :
660 .language
670 LDA #(errorhandler+F%) DIV 256
680 STA veci
690 LDA #(errorhandler+F%) MOD 256
700 STA veclo
710 :
720 .stackset
730 LDX #255
740 TXS
750 CLI
760 JSR &FFE7
770 :
780 .mainloop
790 LDA #ASC"?"
800 JSR &FFEE
810 JSR osrdch

```

Continued ▶



# YELLOW PAGES

## EDUCATION

### ◀ Listing 2 continued

```

820 BCS escape
830 CMP #ASC"*"
840 BEQ star
850 CMP #ASC"0"
860 BCC neither
870 CMP #&3A
880 BCC number
890 CMP #ASC"A"
900 BCC neither
910 CMP #ASC"["
920 BCC letter
930 CMP #ASC"a"
940 BCC neither
950 CMP #ASC"{"
960 BCS neither
970 BCC letter
980 :
990 .star
1000 JSR &FFE7
1010 LDA #ASC"*"
1020 JSR &FFEE
1030 LDY #(paramblock+F%) DIV 256
1040 LDX #(paramblock+F%) MOD 256
1050 LDA #0
1060 JSR &FFF1
1070 BCS escape
1080 :
1090 LDY #buffer DIV 256
1100 LDX #buffer MOD 256
1110 JSR &FFF7
1120 JMP mainloop+F%
1130 :
1140 .escape
1150 LDA #126
1160 JSR &FFF4
1170 BRK
1180 OPT FNequb(1)
1190 OPT FNequs("Escape")
1200 OPT FNequb(0)
1210 :
1220 .number
1230 BRK
1240 OPT FNequb(2)
1250 OPT FNequs("Number")
1260 OPT FNequb(0)
1270 :
1280 .letter
1290 BRK
1300 OPT FNequb(3)
1310 OPT FNequs("Letter")
1320 OPT FNequb(0)
1330 :
1340 .neither
1350 BRK
1360 OPT FNequb(4)
1370 OPT FNequs("Neither")
1380 OPT FNequb(0)
1390 :
1400 .errorhandler
1410 LDY #1
1420 JSR &FFE7
1430 .loop
1440 LDA (&FD),Y
1450 BEQ end
1460 JSR &FFEE
1470 INY
1480 BNE loop
1490 .end

```

Continued ▶

### ◀ Continued

```

1500 JSR &FFE7
1510 JMP stackset+F%
1520 :
1530 .paramblock
1540 OPT FNequb(buffer MOD 256)
1550 OPT FNequb(buffer DIV 256)
1560 OPT FNequb(20)
1570 OPT FNequb(32)
1580 OPT FNequb(127)
1590 :
1600 J
1610 NEXT pass
1620 sum=0
1630 FOR A%=&5000 TO P%-1
1640 sum=sum+A% : NEXT A%
1650 IF sum<>&6DA5 THEN GOTO 1770
1660 END
1670 :
1680 DEF FNequb(N)
1690 ?P%=N
1700 P%=P%+1
1710 =pass
1720 :
1730 DEF FNequs(N$)
1740 $P%=N$
1750 P%=P%+LEN(N$)
1760 =pass
1770 VDU 7:PRINT "Check listing"

```

See Shall we talk?, page 161

### Listing 1. Transmits the SYNC pulse around the Econet

```

10 REM CONDUCT use WITH SYNC
20 REM by Robin Newman
30 REM idea by Dave Bisset
40 REM for BBC B/B+/M/E + Econet
50 REM (c) Acorn User October 1986
60 :
70 DIM txblk% 11:TX=10
80 osbyte=&FFF4:osword=&FFF1
90 REM set up tx control block
100 txblk%?0=&80
110 txblk%?1=&20
120 txblk%?2=&FF
130 txblk%?3=&FF
140 txblk%?4=0
150 txblk%?8=0
160 PROCTx
170 END
180 :
190 DEF PROCTx
200 REPEAT
210 A%=&10
220 X%=txblk% MOD 256
230 Y%=txblk% DIV 256
240 CALL osword
250 TX=TX-1
260 REPEAT
270 A%=&32
280 RX=USR(osbyte) AND &C000
290 UNTIL NOT (RX AND &8000)
300 UNTIL RX=0 OR TX=0
310 ENDPROC

```



# YELLOW PAGES

## EDUCATION

### Listing 2. Waits for the SYNC pulse before continuing

```

0 REM SYNC use with CONDUCT
1 REM by Robin Newman
2 REM idea by Dave Bisset
3 REM for BBC B/B+/M with Econet
4 REM (c) Acorn User October 1986
5 :
6 ON ERROR ONERROR OFF:PROCdelblk(N%
):REPORT:PRINT"at line ";ERL:END
7 osword=&FFF1:osbyte=&FFF4
8 DIM blk%30, buffer%10
9 PROCwait
10 REM main program continues here
20 :
30 PRINT"Example program. Hello there
!":VDU7
40 :
9990 END
10000 DEF PROCwait
10010 REM set up rx control block
10020 blk%?1=&7F
10030 blk%?2=&20
10040 blk%?3=&0
10050 blk%?4=&0
10060 blk%?5=buffer%
10070 blk%?9=buffer%+8
10080 blk%?0=0
10090 X%=blk% MOD 256:Y%=blk% DIV 256
10100 A%=&11
10110 REM osword &11 "opens" receive blo
ck
10120 CALL &FFF1
10130 IF blk%?0=0 THEN PRINT "Can't open
block":END
10140 Cbn%=blk%?0
10150 REM poll block until data received
10160 PROCpoll(Cbn%)
10170 REM delete block
10180 REM don't bother reading dummy dat
a
10190 PROCdelblk(Cbn%)
10200 REM sync pulse received
10210 ENDPROC
10220 :
10230 DEF PROCpoll(N%)
10240 REM osbyte &33 polls
10250 REM N% contains rx block number
10260 A%=&33:X%=N%
10270 R%=USR &FFF4
10280 Xreg%=R% AND &FF00
10290 REM poll till Xreg%=&8000
10300 IF Xreg%<>&8000 THEN GOTO 10260
10310 REM sync pulse received
10320 ENDPROC
10330 :
10340 DEF PROCdelblk(N%)
10350 REM deletes rx block held in N%
10360 A%=&34:X%=N%
10370 CALL &FFF4
10380 ENDPROC

```

### Listing 3. Converts model B format function keys to Master

```

10 REM Model B keys t
o Master
20 REM by Robin Newma
n
30 REM for BBC B/B+/M
with Econet
40 REM (c) Acorn User
50 :
60 DIM cli 40
70 srckey=&70:destkey
=&72
80 sortA=&74:sortB=&7
6
90 FOR Z%=0 TO 3 STEP
3
100 P%=&A00
110 OPT Z%
120 LDA &F4
130 ORA #&B0
140 STA &F4
150 STA &FE30
160 LDY #&10
170 :
180 .clr
190 LDA #&22
200 STA &B000,Y
210 LDA #&B0
220 STA &B011,Y
230 DEY
240 BPL clr
250 JSR ptrshift
260 LDA #&B
270 STA srckey+1
280 LDX #0
290 :
300 .nxt
310 JSR findlen
320 TAY
330 CLC
340 ADC &8000,X
350 STA &8001,X
360 LDA &B00,X
370 CLC
380 ADC #1
390 STA srckey
400 LDA &8000,X
410 STA destkey
420 LDA &B011,X
430 STA destkey+1
440 CPY #0
450 BEQ nokey
460 DEY
470 :
480 .shift
490 LDA (srckey),Y
500 STA (destkey),Y
510 DEY
520 BPL shift
530 :
540 .nokey
550 INX
560 CPX #16
570 BNE nxt
580 LDA &F4
590 AND #&7F
600 STA &F4
610 STA &FE30
620 RTS
630 .ptrshift
640 LDX #&10
650 :
660 .nxptr
670 LDA &B00,X
680 STA buf,X
690 DEX
700 BPL nxptr
710 :
720 .sort
730 LDA #buf MOD 256
740 STA sortA
750 CLC
760 ADC #1
770 STA sortB
780 LDA #buf DIV 256
790 STA sortA+1
800 ADC #0
810 STA sortB+1
820 LDX #&10
830 STX len
840 :
850 .nxsort
860 LDX len
870 LDY #0
880 STY flag
890 :
900 .sorloop
910 LDA (sortB),Y
920 CMP (sortA),Y
930 BCS noswap
940 PHA
950 LDA (sortA),Y
960 STA (sortB),Y

```

Continued ►



# YELLOW PAGES

## EDUCATION

### ◀ Listing 3 continued

```

970 PLA
980 STA (sortA),Y
990 LDA #1
1000 STA flag
1010 :
1020 .noswap
1030 INY
1040 DEX
1050 BNE sorloop
1060 LDA flag
1070 BEQ sorexit
1080 DEC len
1090 BNE nxsort
1100 .sorexit
1110 RTS
1120 :
1130 .findlen
1140 LDA &B00,X
1150 STX flag
1160 LDX #&F
1170 :
1180 .nxtfind
1190 CMP buf,X
1200 BEQ found
1210 DEX
1220 BPL nxtfind
1230 :

1240 .found
1250 INX
1260 LDA buf,X
1270 LDX flag
1280 SEC
1290 SBC &B00,X
1300 RTS
1310 .flag
1320 OPT FNequb(0)
1330 .len
1340 OPT FNequb(0)
1350 .buf
1360 OPT FNequs(STRING$
(17,CHR#0))
1370 J
1380 NEXT
1390 PROCchecksum
1400 PRINT"Press SPACE
BAR to save code ";
1410 REPEAT UNTIL GET=3
2
1420 A$="SAVE KBM A00 "
+STR$~P%
1430 PROCcli(A$)
1440 PRINT"Code saved
as KBM"
1450 END

1460 :
1470 DEF PROCcli($cli)
1480 LOCAL X%,Y%
1490 X%=cli MOD 256
1500 Y%=cli DIV 256
1510 CALL &FFF7
1520 ENDPROC
1530 :
1540 DEF FNequb(D%)
1550 ?P%=D%
1560 P%=P%+1
1570 =Z%
1580 :
1590 DEF FNequs(A$)
1600 $P%=A$
1610 P%=P%+LEN(A$)
1620 =Z%
1630 :
1640 DEF PROCchecksum
1650 sum=0
1660 FOR X%=&A00 TO P%-
1
1670 sum=sum+?X%
1680 NEXT
1690 IF sum<>&5888 PRIN
T"Checksum error:- check
program":STOP
1700 ENDPROC

```

### Listing 4. Converts Master format function keys to model B

```

>
10 REM Master keys to
Model B
20 REM By Robin Newma
n
30 REM for Master wi
th Econet
40 REM (c) Acorn User
October 1986
50 :
60 DIM cli 40
70 ptr1=&70
80 ptr2=&72
90 FOR Z%=0 TO 3 STEP
3
100 P%=&A00
110 I
120 OPT Z%
130 LDA &F4
140 ORA #&80
150 STA &F4
160 STA &FE30
170 LDA #&10
180 LDY #0
190 :
200 .clr
210 STA &B00,Y
220 DEY
230 BNE clr
240 LDA #&B
250 STA ptr2+1
260 LDX #0
270 :
280 .nxt
290 LDA &B001,X
300 SEC
310 SBC &B000,X
320 TAY
330 CLC
340 ADC &B00,X
350 STA &B01,X
360 LDA &B00,X
370 CLC
380 ADC #1
390 STA ptr2
400 LDA &B000,X
410 STA ptr1
420 LDA &B011,X
430 STA ptr1+1
440 DEY
450 :
460 .shift
470 LDA (ptr1),Y
480 STA (ptr2),Y
490 DEY
500 BPL shift
510 INX
520 CPX #16
530 BNE nxt
540 LDX #0
550 :
560 .check
570 LDA &B00,X
580 CMP &B01,X
590 BNE skip
600 LDA &B10
610 STA &B00,X
620 :
630 .skip
640 INX
650 CPX #15
660 BNE check
670 LDA &F4
680 AND #&7F
690 STA &F4
700 STA &FE30
710 RTS
720 J
730 NEXT
740 PROCchecksum
750 PRINT"Press SPACE
BAR to save code ";
760 REPEAT UNTIL GET=3
2
770 A$="SAVE KMB A00 "
+STR$~P%
780 PROCcli(A$)
790 PRINT"Code saved
as KMB"
800 END
810 :
820 DEF PROCcli($cli)
830 LOCAL X%,Y%
840 X%=cli MOD 256
850 Y%=cli DIV 256
860 CALL &FFF7
870 ENDPROC
880 :
890 DEF PROCchecksum
900 sum=0
910 FOR X%=&A00 TO P%-
1
920 sum=sum+?X%
930 NEXT
940 IF sum<>&2D47 PRI
NT"Checksum error:-check
program":STOP
950 ENDPROC

```



# YELLOW PAGES

## T O P O F T H E L I S T

### Listing 5. Shifts user-defined characters from page &C00 to page &8F00

```

10 REM Character definition loader
20 REM By Robin Newman
30 REM for BBC Master + Econet
40 REM (c) Acorn User October 1986
50 :
60 FOR Z%=0 TO 3 STEP 3
70 P%=&A00
80 LOPT Z%
90 \ set MSB in ROMSEL to select RAM at &8000
100 LDA &F4
110 ORA #&80
120 STA &FE30
130 STA &F4
140 LDY #0
150 \ shift page &C to &8F00
160 .shift LDA &C00,Y
170 STA &8F00,Y
180 DEY
190 BNE shift
200 \ reset MSB in ROMSEL to select ROMs at &B000
210 LDA &F4
220 AND #&7F
230 STA &F4
240 STA &FE30
250 RTS
260 J
270 NEXT
280 PRINT"Press SPACE BAR to save the code ";
290 REPEAT UNTIL GET = 32
300 *SAVE shift A00 A1E
310 PRINT"Code saved as shift"

```

### Top of the list

The Acorn User Gallery Disc was a popular feature of the Acorn User stand at the AU show last July. Much comment was passed at the way in which graphics screens had been saved in a very compact form.

The Screen Compactor program is very efficient, as proved by the fact that the 80 track version of the gallery disc contains no less than 28 20k screens plus Super Painter and Pixel Editor – nearly 600k of information crammed into less than 200k of disc space!

The compacting program, called SVPIC, is machine code and is a multi-pass compactor. In other words it will compact a graphics screen several times over until it makes a clean pass without compacting it any further. The compactor also saves the current mode value and the colour palette details – these are used by the loader program LDPIC to ensure that the program is loaded into the correct mode

and that the colours are all correct.

### Using SVPIC

You will need the screen picture you wish to compress and the SVPIC code on the same disc. If the screen is called CAN and is in mode 1 we could compress this with the following short program:

```

10 MODE 1
20 *LOAD CAN 3000
30 *SVPIC CANNED

```

Compression can take a few minutes so do be patient.

### Using LDPIC

This is quite simple to use just ensure that the LDPIC code is on the same disc and enter:

```
*LDPIC CANNED
```

assuming that CANNED is the name of the file to be loaded back in.

### David Acton's Screen Loader program, LDPIC

```

10 REM Screen Loader
20 REM David Acton/Bruce Smith
30 REM BBC B/B+/M/Elite
40 REM (c) Acorn User October 1986
50 :
60 PROCvars
70 PROCassemble
80 PROCchecksum
90 *SAVE Ldpic 2E00 2F35
100 END
110 :
120 DEF PROCvars
130 osbyte=&FFF4:osfind=&FFCE
140 oswrch=&FFEE:osbget=&FFD7
150 ENDPROC
160 :
170 DEF PROCassemble
180 FOR pass=0 TO 3 STEP 3
190 P%=&2E00
200 LOPT pass
210 LDA #&06
220 CLC
230 ADC &F2
240 TAX
250 LDA &F3
260 ADC #&00
270 TAY
280 LDA #&40
290 JSR osfind
300 CMP #&00
310 BNE noerror
320 BRK
330 J
340 ?P%=&D6:P%=P%+1
350 *P%="No Screen File"
360 P%=P%+LEN(*P%)
370 LOPT pass
380 BRK
390 .noerror
400 STA &75
410 LDA #&01
420 STA &73
430 LDX #&08
440 JSR subroutine1
450 STA &7A
460 LDX #&08
470 JSR subroutine1
480 STA &7B
490 LDA #&A0
500 LDX #&55
510 JSR osbyte
520 TAX
530 CMP &7B
540 BEQ nochange
550 LDA #&16
560 JSR oswrch
570 LDA &7B
580 JSR oswrch
590 LDX #&09
600 .nextbyte
610 LDA buffer,X
620 JSR oswrch
630 DEX
640 BPL nextbyte
650 .nochange
660 LDA #&B4
670 LDX #&00
680 LDY #&00
690 JSR osbyte
700 STX &7C
710 STY &7D
720 LDX #&0F
730 .loop
740 LDA #&13
750 JSR oswrch
760 TAX
770 PHA
780 JSR oswrch
790 LDX #&04
800 JSR subroutine1
810 JSR oswrch
820 LDA #&00

```

Continued ►



# YELLOW PAGES

## T O P O F T H E L I S T

### ◀ Continued

830 JSR oswrch	1230 JSR subroutine1	1630 .trynext
840 JSR oswrch	1240 LDY #&00	1640 CLC
850 JSR oswrch	1250 STA (&70),Y	1650 ROR &76
860 PLA	1260 JSR addmove	1660 DEX
870 TAX	1270 .ahead	1670 BNE trynext
880 DEX	1280 LDA &71	1680 .return
890 BPL loop	1290 BPL rightback	1690 LDA &76
900 LDX #&08	1300 DEC &7F	1700 RTS
910 JSR subroutine1	1310 BEQ carryon	1710 .swap
920 STA &7E	1320 JMP redo	1720 LDA &7C
930 LDX #&08	1330 .carryon	1730 STA &70
940 JSR subroutine1	1340 LDA #&00	1740 LDA &7D
950 STA &88	1350 LDY &75	1750 STA &71
960 LDA &7E	1360 JMP osfind	1760 RTS
970 STA &7F	1370 .subroutine2	1770 .addmove
980 .redo	1380 DEC &73	1780 LDA &70
990 JSR swap	1390 BNE noget	1790 CLC
1000 LDA &7F	1400 LDY &75	1800 ADC &7E
1010 SEC	1410 JSR osbget	1810 STA &70
1020 SBC #&01	1420 STA &74	1820 LDA &71
1030 STA &70	1430 LDA #&08	1830 ADC #&00
1040 .rightback	1440 STA &73	1840 STA &71
1050 JSR subroutine2	1450 .noget	1850 RTS
1060 BCC forward	1460 ASL &74	1860 .buffer
1070 LDX &88	1470 RTS	1870 J
1080 JSR subroutine1	1480 .subroutine1	1880 NEXT
1090 STA &77	1490 STX &79	1890 ENDPROC
1100 LDX &7A	1500 LDA #&08	1900 :
1110 JSR subroutine1	1510 SEC	1910 DEF PROCchecksum
1120 STA &78	1520 SBC &79	1920 C%=0
1130 LDY #&00	1530 STA &79	1930 FOR X%=&2E00 TO &2
1140 .goback	1540 LDA #&00	F32
1150 LDA &78	1550 STA &76	1940 C%=C%+?X%
1160 STA (&70),Y	1560 .nextbit	1950 NEXT
1170 JSR addmove	1570 JSR subroutine2	1960 IF C%=37790 THEN E
1180 DEC &77	1580 ROR &76	NDPROC
1190 BNE goback	1590 DEX	1970 VDU 7
1200 JMP ahead	1600 BNE nextbit	1980 PRINT"Checksum err
1210 .forward	1610 LDX &79	or!"
1220 LDX &7A	1620 BEQ return	1990 STOP

### SVPIC, the Screen Compressor listing

10 REM Screen Compres	180 LDA #&02	400 BCC forward10
20 REM David Acton/Br	190 STA &82	410 BNE roll
30 REM BBC B/B+/M/E	200 JSR writecat	420 LDA &80
40 REM (C) Acorn User	210 LDA #&00	430 CMP &86
50 : October 1986	220 STA &83	440 BCS roll
60 PROCassemble	230 LDA #&FF	450 .forward10
70 PROCchecksum	240 STA &86	460 LDA &80
80 *SAVE SVPIC 2E00 2	250 STA &87	470 STA &86
90 END	260 LDA #&01	480 LDA &81
100 :	270 STA &82	490 STA &87
110 DEF PROCassemble	280 .restart	500 LDA &82
120 FOR pass=0 TO 3 ST	290 LDA #&02	510 STA &85
EP 3	300 STA &88	520 LDA &88
130 P%=&2E00	310 LDA #&03	530 STA &89
140 [OPT pass	320 STA &79	540 LDA &79
150 STY &84	330 .redo	550 STA &8A
160 LDA #&01	340 LDA #&00	560 .roll
170 STA &83	350 STA &80	570 SEC
	360 STA &81	580 ROL &79
	370 JSR subone	590 INC &88
	380 LDA &81	600 LDA &88
	390 CMP &87	610 CMP #&09

Continued ▶



# YELLOW PAGES

## T O P O F T H E L I S T

### ◀ Continued

620 BNE redo	1300 STA &70	1990 LDA #&08
630 INC &82	1310 LDA &71	2000 STA &73
640 LDA &82	1320 SBC #&00	2010 LDA #&84
650 CMP #&09	1330 STA &71	2020 LDX #&00
660 BNE restart	1340 .forward	2030 LDY #&00
670 LDA #&01	1350 JSR addthem	2040 JSR &FFF4
680 STA &83	1360 BPL allagain	2050 STX &7C
690 LDA &85	1370 DEC &7F	2060 STY &7D
700 STA &82	1380 BPL doall	2070 JSR copy
710 LDX #&08	1390 RTS	2080 LDY #&00
720 STX &73	1400 .subtwo	2090 LDX #&01
730 JSR transfer	1410 LDX #&08	2100 STX &7A
740 LDX #&08	1420 LDA #&00	2110 STX &7F
750 LDA &89	1430 JSR transfer	2120 .back10
760 STA &88	1440 LDA #&00	2130 STX &7E
770 JSR transfer	1450 LDY &75	2140 LDA &7A
780 LDA &8A	1460 JMP &FFCE	2150 CMP (&70),Y
790 STA &79	1470 .subthree	2160 BCS over8
800 JSR subone	1480 ROL &74	2170 SEC
810 JMP subtwo	1490 DEC &73	2180 ROL &7A
820 .subone	1500 BNE return	2190 INX
830 LDA &82	1510 INC &80	2200 BNE back10
840 STA &7E	1520 BNE nohigh	2210 .over8
850 SEC	1530 INC &81	2220 JSR addthem
860 SBC #&01	1540 .nohigh	2230 BPL back10
870 STA &7F	1550 LDA &83	2240 STX &7A
880 .doall	1560 BEQ noput	2250 LDX #&08
890 JSR copy	1570 LDY &75	2260 LDA &7A
900 LDA &7F	1580 LDA &74	2270 JSR transfer
910 STA &70	1590 JSR &FFD4	2280 LDX #&55
920 .allagain	1600 .noput	2290 LDY #&00
930 LDY #&00	1610 LDA #&08	2300 LDA #&A0
940 LDA (&70),Y	1620 STA &73	2310 JSR &FFF4
950 LDY &7E	1630 .return	2320 TXA
960 CMP (&70),Y	1640 RTS	2330 LDX #&08
970 BEQ over16	1650 .transfer	2340 JSR transfer
980 CLC	1660 LSR A	2350 LDX #&0F
990 JSR subthree	1670 PHA	2360 .back17
1000 LDX &7A	1680 JSR subthree	2370 TXA
1010 LDY #&00	1690 PLA	2380 STA &8B
1020 LDA (&70),Y	1700 DEX	2390 PHA
1030 JSR transfer	1710 BNE transfer	2400 LDX #&8B
1040 JMP forward	1720 RTS	2410 LDY #&00
1050 .over16	1730 .copy	2420 LDA #&0B
1060 STA &78	1740 LDA &7C	2430 JSR &FFF1
1070 LDY #&00	1750 STA &70	2440 LDA &8C
1080 STY &77	1760 LDA &7D	2450 LDX #&04
1081 .back11	1770 STA &71	2460 JSR transfer
1090 INC &77	1780 RTS	2470 PLA
1100 JSR addthem	1790 .addthem	2480 TAX
1110 BMI setcarry	1800 LDA &70	2490 DEX
1120 LDA &77	1810 CLC	2500 BPL back17
1130 CMP &79	1820 ADC &7E	2510 RTS
1140 BEQ setcarry	1830 STA &70	2520 J
1150 LDA (&70),Y	1840 LDA &71	2530 NEXT
1160 CMP &78	1850 ADC #&00	2540 ENDPROC
1170 BEQ back11	1860 STA &71	2550 :
1180 .setcarry	1870 RTS	2560 DEF PROCchecksum
1190 SEC	1880 .writecat	2570 C% = 0
1200 JSR subthree	1890 LDA &84	2580 FOR X% = &900 TO &AA
1210 LDA &77	1900 CLC	E
1220 LDX &88	1910 ADC &F2	2590 C% = C% + ?X%
1230 JSR transfer	1920 TAX	2600 NEXT
1240 LDA &78	1930 LDA &F3	2610 IF C% = 46068 THEN E
1250 LDX &7A	1940 ADC #&00	NDPROC
1260 JSR transfer	1950 TAY	2620 VDU 7
1270 LDA &70	1960 LDA #&80	2630 PRINT "Checksum err
1280 SEC	1970 JSR &FFCE	or!"
1290 SBC &7E	1980 STA &75	2640 END



# ACORN USER ORDER FORM

## ACORN USER OFFERS

### DISC SUBSCRIPTIONS

Yes! Please send me my free disc binder and start my disc subscription

from the \_\_\_\_\_ Issue

- |                       |                                 |
|-----------------------|---------------------------------|
| 01 UK                 | <input type="checkbox"/> £69.00 |
| 02 EUROPE (Airmail)   | <input type="checkbox"/> £76.00 |
| 02 OVERSEAS (Surface) | <input type="checkbox"/> £76.00 |
| 03 OVERSEAS (Airmail) | <input type="checkbox"/> £84.00 |

TOTAL VALUE £ \_\_\_\_\_

### CASSETTE SUBSCRIPTIONS

Yes! Please start my cassette subscription from the \_\_\_\_\_ Issue  
and send me my free games cassette

- |                       |                                 |
|-----------------------|---------------------------------|
| 01 UK                 | <input type="checkbox"/> £45.00 |
| 02 EUROPE (Airmail)   | <input type="checkbox"/> £52.00 |
| 02 OVERSEAS (Surface) | <input type="checkbox"/> £52.00 |
| 03 OVERSEAS (Airmail) | <input type="checkbox"/> £62.00 |

TOTAL VALUE £ \_\_\_\_\_

### MAGAZINE SUBSCRIPTIONS

Yes! Please start my subscription to Acorn User magazine from the

\_\_\_\_\_ Issue

- |                          | 12 Issues                       | 27 Issues                       |
|--------------------------|---------------------------------|---------------------------------|
| 01 UK                    | <input type="checkbox"/> £17.50 | <input type="checkbox"/> £35.00 |
| 02 EUROPE                | <input type="checkbox"/> £25.00 | <input type="checkbox"/> £50.00 |
| 03 MIDDLE EAST           | <input type="checkbox"/> £30.00 | <input type="checkbox"/> £60.00 |
| 04 THE AMERICAS & AFRICA | <input type="checkbox"/> £35.00 | <input type="checkbox"/> £70.00 |
| 05 REST OF THE WORLD     | <input type="checkbox"/> £40.00 | <input type="checkbox"/> £80.00 |

TOTAL VALUE £ \_\_\_\_\_

### ACORN USER MONTHLY DISCS

- |                                     |                                     |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|
| 1985                                | 1986                                |                                     |
| <input type="checkbox"/> OCT 0201-1 | <input type="checkbox"/> JAN 0204-6 | <input type="checkbox"/> JUL 0210-0 |
| <input type="checkbox"/> NOV 0202-X | <input type="checkbox"/> FEB 0205-4 | <input type="checkbox"/> AUG 0211-9 |
| <input type="checkbox"/> DEC 0203-8 | <input type="checkbox"/> MAR 0206-2 | <input type="checkbox"/> SEP 0212-7 |
|                                     | <input type="checkbox"/> APR 0207-0 | <input type="checkbox"/> OCT 0213-5 |
|                                     | <input type="checkbox"/> MAY 0208-9 |                                     |
|                                     | <input type="checkbox"/> JUN 0209-7 |                                     |

UK = £5.95

Europe = £6.95

Overseas = £7.95

TOTAL VALUE £ \_\_\_\_\_

### ACORN USER MONTHLY CASSETTES

- |                                     |                                     |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|
| 1984                                | 1985                                | 1986                                |
| <input type="checkbox"/> MAY 0401-4 | <input type="checkbox"/> JAN 0409-X | <input type="checkbox"/> JAN 0421-9 |
| <input type="checkbox"/> JUN 0402-2 | <input type="checkbox"/> FEB 0410-3 | <input type="checkbox"/> FEB 0422-7 |
| <input type="checkbox"/> JUL 0403-0 | <input type="checkbox"/> MAR 0411-1 | <input type="checkbox"/> MAR 0423-5 |
| <input type="checkbox"/> AUG 0404-9 | <input type="checkbox"/> APR 0412-X | <input type="checkbox"/> APR 0424-3 |
| <input type="checkbox"/> SEP 0405-7 | <input type="checkbox"/> MAY 0413-8 | <input type="checkbox"/> MAY 0425-1 |
| <input type="checkbox"/> OCT 0406-5 | <input type="checkbox"/> JUN 0414-6 | <input type="checkbox"/> JUN 0426-X |
| <input type="checkbox"/> NOV 0407-3 | <input type="checkbox"/> JUL 0415-4 | <input type="checkbox"/> JUL 0427-8 |
| <input type="checkbox"/> DEC 0408-1 | <input type="checkbox"/> AUG 0416-2 | <input type="checkbox"/> AUG 0428-6 |
|                                     | <input type="checkbox"/> SEP 0417-0 | <input type="checkbox"/> SEP 0429-4 |
|                                     | <input type="checkbox"/> OCT 0418-9 | <input type="checkbox"/> OCT 0430-8 |
|                                     | <input type="checkbox"/> NOV 0419-7 |                                     |
|                                     | <input type="checkbox"/> DEC 0420-0 |                                     |

UK = £3.95

Europe = £4.95

Overseas = £5.95

TOTAL VALUE £ \_\_\_\_\_

### ACORN USER SPECIAL DISCS

- GALLERY 40 track 0801-X ☐ 80 track 0802-8 ☐  
 DISC HELP DISC 80 track 0804-4 ☐  
 UK = £6.95 Europe = £7.95 Overseas = £8.95

- EDUCATION SOFTWARE 40 track 0815-X ☐  
 UK = £7.95 Europe = £8.95 Overseas = £9.95

- ECONET UTILITIES 80 track 0809-5 ☐  
 UK = £19.95 Europe = £20.95 Overseas = £21.95

- | BIBLIOGRAPHY               | UK                                     | EUROPE                          | OVERSEAS                        |
|----------------------------|--|---------------------------------|---------------------------------|
| 40T - Jul 1982 to May 1984 | 0851-6 <input type="checkbox"/> £7.95  | <input type="checkbox"/> £8.95  | <input type="checkbox"/> £9.95  |
| 40T - Jun 1984 to May 1985 | 0852-4 <input type="checkbox"/> £7.95  | <input type="checkbox"/> £8.95  | <input type="checkbox"/> £9.95  |
| 40T - Jun 1985 to Feb 1986 | 0853-2 <input type="checkbox"/> £7.95  | <input type="checkbox"/> £8.95  | <input type="checkbox"/> £9.95  |
| 40T - Jun 1982 to Feb 1986 | 0881-8 <input type="checkbox"/> £21.95 | <input type="checkbox"/> £22.95 | <input type="checkbox"/> £23.95 |
| 80T - Jul 1982 to May 1985 | 0901-6 <input type="checkbox"/> £11.95 | <input type="checkbox"/> £12.95 | <input type="checkbox"/> £13.95 |
| 80T - Jun 1985 to Feb 1986 | 0902-4 <input type="checkbox"/> £7.95  | <input type="checkbox"/> £8.95  | <input type="checkbox"/> £9.95  |
| 80T - Jul 1982 to Feb 1986 | 0931-8 <input type="checkbox"/> £17.95 | <input type="checkbox"/> £18.95 | <input type="checkbox"/> £19.95 |

TOTAL VALUE £ \_\_\_\_\_

Telephone Orders 01-836 2441 9.30 am to 5.00 pm. Ask for Seran.



# ACORN USER ORDER FORM

## ACORN USER OFFERS

### ACORN USER ROMS

- |  |                   |
|--|-------------------|
| <input type="checkbox"/> USERDUMP 1001-4 | UK = £19.95       |
| <input type="checkbox"/> USERROM 1002-2  | Europe = £20.95   |
| <input type="checkbox"/> AXR ROM 1003-0  | Overseas = £21.95 |

TOTAL VALUE £ \_\_\_\_\_

### ACORN USER SPECIAL CASSETTES

- |   |                  |
|---|------------------|
| <input type="checkbox"/> ACORN USER GRAPHICS 0601-7 | UK = £3.95       |
| <input type="checkbox"/> BEST OF ACORN USER 0602-5  | Europe = £4.95   |
| <input type="checkbox"/> GAMES COMPENDIUM 0603-3    | Overseas = £5.95 |

TOTAL VALUE £ \_\_\_\_\_

### BINDERS

- |                        | UK                             | EUROPE                          | OVERSEAS                        |
|------------------------|--------------------------------|---------------------------------|---------------------------------|
| MAGAZINE BINDER 1201-7 | <input type="checkbox"/> £4.95 | <input type="checkbox"/> £7.95  | <input type="checkbox"/> £14.95 |
| DISC BINDER 1301-3     | <input type="checkbox"/> £9.95 | <input type="checkbox"/> £12.95 | <input type="checkbox"/> £19.95 |

TOTAL VALUE £ \_\_\_\_\_

### ACORN USER MAGAZINE BACK ISSUES

- | 1984                                | 1985                                | 1986                                |
|-------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> MAY 0013-2 | <input type="checkbox"/> JAN 0021-3 | <input type="checkbox"/> JAN 0032-9 |
| <input type="checkbox"/> JUN 0014-0 | <input type="checkbox"/> MAR 0022-1 | <input type="checkbox"/> FEB 0033-7 |
| <input type="checkbox"/> JUL 0015-9 | <input type="checkbox"/> APR 0023-X | <input type="checkbox"/> MAR 0034-5 |
| <input type="checkbox"/> AUG 0016-7 | <input type="checkbox"/> MAY 0024-8 | <input type="checkbox"/> APR 0035-3 |
| <input type="checkbox"/> SEP 0017-5 | <input type="checkbox"/> JUN 0025-6 | <input type="checkbox"/> MAY 0036-1 |
| <input type="checkbox"/> OCT 0018-3 | <input type="checkbox"/> JUL 0026-4 | <input type="checkbox"/> JUN 0037-X |
| <input type="checkbox"/> NOV 0019-1 | <input type="checkbox"/> AUG 0027-2 | <input type="checkbox"/> JUL 0038-8 |
| <input type="checkbox"/> DEC 0020-5 | <input type="checkbox"/> SEP 0028-0 | <input type="checkbox"/> AUG 0039-6 |
|                                     | <input type="checkbox"/> OCT 0029-9 | <input type="checkbox"/> SEP 0040-X |
|                                     | <input type="checkbox"/> NOV 0030-2 | <input type="checkbox"/> OCT 0041-8 |
|                                     | <input type="checkbox"/> DEC 0031-0 |                                     |

UK = £1.75 Europe = £2.25 Overseas = £3.75

TOTAL VALUE £ \_\_\_\_\_

Please answer these questions to help us improve your magazine

- Do you use your micro for?:  
1 ☐ SCHOOL 2 ☐ BUSINESS 3 ☐ HOBBY
- Do you intend to buy any of the following?:  
1 ☐ MONITOR 2 ☐ DISC DRIVE 3 ☐ SECOND PROCESSOR  
4 ☐ PRINTER 5 ☐ MODEM
- How many software packages do you think you will buy in the next few months?:  
1 ☐ 0-5 2 ☐ 6-10 3 ☐ 10 or more

☐ I enclose a sterling cheque/postal order for a total of £ \_\_\_\_\_ made payable to **Redwood Publishing**.

☐ Please debit my ☐ Visa (Barclaycard) ☐ Access (Mastercard)

\* Overseas orders are now sent Airmail

Credit card number           Expiry date

SIGNED

DATE

MR/MRS/MISS/MS

INITIALS

SURNAME

ADDRESS

POSTCODE

TELEPHONE

Please return your order to:- Acorn User Mail Order, Lambourn Woodlands, Newbury, Berkshire RG16 7TW.

For Office Use Only

0	0																		
2	0	0	1	X		0	2	7		N		Y		D		P			
B41																			

HA27

Telephone Orders 01-836 2441 9.30 am to 5.00 pm. Ask for Seran



# CHARTS

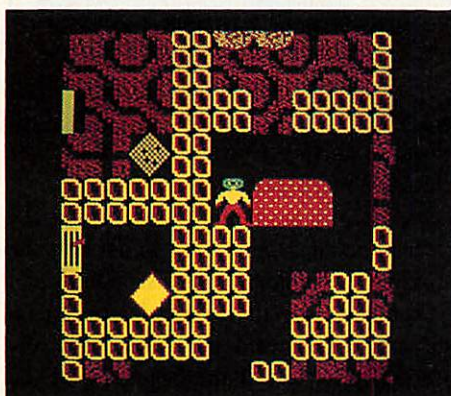
Check out the latest position of your favourite game

## TOP 20 BBC MICRO GAMES

	Title	Publisher	Cassette	Disc	B+	Master	Reviewed
1	(-) Thrust	Superior	£7.95	£11.95	Yes	Yes	-
2	(1) Commando	Elite	£9.95	£14.95	Yes	Yes	August '86
3	(-) Air Wolf	Elite	£9.95	£14.95	Yes	Yes	-
4	(20) Ian Bothams Test Cricket	Tynesoft	£7.95	£11.95	Yes	Yes	-
5	(2) Tennis	Bug-Byte	£2.99	-	Yes	Yes	September '86
6	(-) Cricket	Bug-Byte	£2.99	-	Yes	Yes	-
7	(18) Star Force 7	Bug-Byte	£2.99	-	Yes	Yes	October '86
8	(11) Citadel	Superior	£9.95	£11.95	Yes	*	March '86
9	(-) Way of the Exploding Fist	Melbourne House	£9.95	-	Yes*	Yes*	April '86
10	(3) Winter Olympics	Tynesoft	£9.95	-	*	*	September '86
11	(15) Repton 2	Superior	£9.95	£11.95	*	*	December '85
12	(-) Waterloo	Lothlorien	£9.95	£12.95	Yes	Yes	April '86
13	(10) Phantom Combat	Doctor Soft	£9.95	£11.95	Yes	Yes	February '86
14	(17) Savage Pond	Bug-Byte	£2.99	-	*	*	September '86
15	(12) Computer Hits 10 Volume 2	Beau Jolly	£9.95	-	Yes	No	July '86
16	(7) Galactic Patrol	Mastertronic	£1.99	-	No	No	-
17	(5) Karate Combat	Superior	£8.95	£11.95	No	No	July '86
18	(9) Yie Ar Kung Fu	Imagine	£9.95	£12.95	Yes*	Yes*	March '86
19	(8) Jet Set Willy	Tynesoft	£7.95	£9.95	Yes	Yes	-
20	(-) Strike Force Harrier	Mirrorsoft	£9.95	£12.95	Yes	Yes*	January '86



Winter Olympics: Slips on the ice down to 10



Repton 2: Superior's game is still a bestseller



Commando: Still storming the chart at no. 2

## TOP 10 ELECTRON GAMES

	Title	Publisher	Cassette	Disc	Reviewed
1	(1) Galactic Patrol	Mastertronic	£1.99	-	-
2	(3) Computer Hits 10 Volume 2	Beau Jolly	£9.95	-	July '86
3	(2) Commando	Elite	£9.95	£14.95	August '86
4	(7) Yie Ar Kung Fu	Imagine	£9.95	£12.95	March '86
5	(-) Citadel	Superior	£9.95	£11.95	March '86
6	(-) Cricket	Bug-Byte	£2.99	-	-
7	(-) Star Drifter	Firebird	£3.95	-	-
8	(-) Hulk	Americana	£2.99	-	-
9	(-) Computer Hits 10	Beau Jolly	£9.95	-	July '86
10	(4) Tennis	Bug-Byte	£2.99	-	September '86

COMPILED BY GALLUP/MICROSCOPE

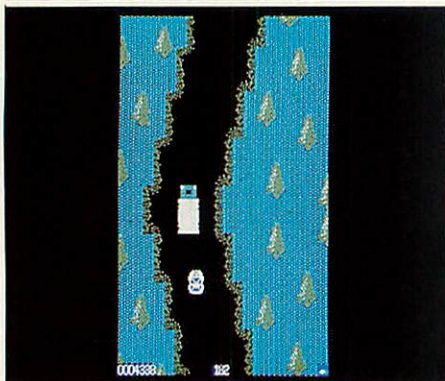
\*PLEASE CHECK B+/MASTER COMPATIBILITY BEFORE BUYING



# REVIEWS

## GAMES

### LIVE AND LET DIE



'Spy Hunter', US Gold, BBC B, £9.99 (cassette), £14.99 (disc)

In *Spy Hunter*, you assume the role of a James Bond-style secret agent. Your mission is simply to keep your spy car on the road along which you are driving. Sounds easy? Well it would be, if it wasn't for the enemy cars. With names like The Enforcer, Switch Blade, Mad Bomber and Doctor Torpedo, you know you're in for trouble.

The action starts when a van drives up the road and your car is rolled out of the back. From here on in you are on your own!

You must drive along the road keeping an eye out for enemy cars among the normal traffic. They are not difficult to spot as they invariably try to force you off the road or alternatively, shoot you!

To assist you in combating the enemy threat, your car is initially equipped with forward-firing machine guns.

However, as the game progresses you can collect extra weaponry for your arsenal such as a missile launcher, an oil slick generator and a smoke screen.

As if this wasn't enough every now and again you get the chance to drive down a fork in the road to a boat house. Here your car changes instantly into a speed boat and the battle re-commences on water.

*Spy Hunter* is well designed with attractive graphics and reasonable sound. Keyboard response is also very good.

A unique feature of the game is that at any time pressing key f-0 causes the screen to toggle between a small high resolution dis-

play and a large low resolution one. One small criticism is that during loading, a high resolution title screen is loaded in directly from the tape. Although this title screen is very good it does increase the loading time of the already very long program.

Despite this small annoying point, *Spy Hunter* is a well presented thoroughly enjoyable game.

Mike Ginns

### DOING BATTLE WITH WHO DUN PONG



'Woks', Artic Computing, BBC B/Electron, £1.99 (cassette)

There often comes a point, when reading the description of a game, you know that the program itself is going to be disappointing.

*Woks* has a mercifully short description on the cassette inlay card, but a tortuously verbose introduction at the beginning of the game. Here you are told that the tyrant emperor Who Dun Pong (yes, I'm afraid so) has hidden a number of woks in strongrooms in the palace to stop his people getting fat.

As if you haven't already guessed, your job is to find the woks, avoiding the guards on the way. And it's a race against time, with bonus points for those who finish each screen quickly. This is all described for you in text that might amuse the very young, with its tedious swapping of Rs and Ls—but if I was Chinese I would find it insulting.

The game takes some time to load in, especially when you consider what you get at the end of it. The reason is probably all the dispensible text. Once you've read it you find there are still more files to be loaded.

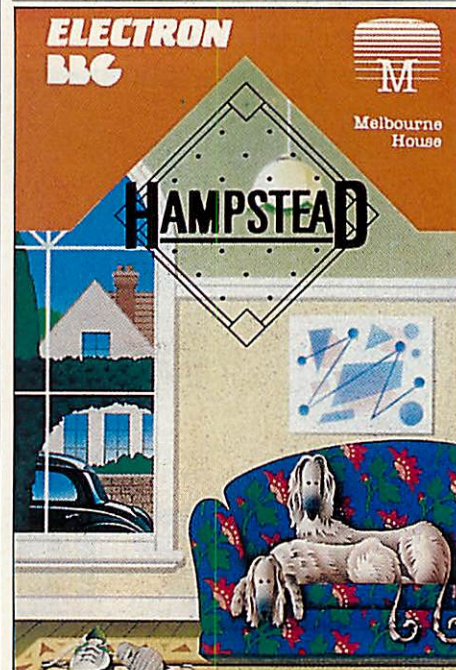
When finally you do get to it you're faced with yet another platform-type game. The graphics are hardly world-shattering but pretty enough. The movement of the figures I found a little jerky, however. Also the character you control does not respond particularly well to the keys.

While on the subject of keys, I found the choice rather cumbersome. Why isn't the player allowed to choose the keys?

In the end, I decided the people are better off without their woks. The emperor was probably right—all those greasy noodles are undoubtedly bad for them. Oh, and by the way, the game doesn't work on the Master.

Steve Mansfield

### CALLING ALL SOCIAL CLIMBERS



'Hampstead', Melbourne House, BBC micro/Electron, £6.95 (cassette)

This is the game for all those people looking for a bit of relief from the nasty goblins, wizards and dungeons that are so often the standard fare of adventures.

In this text-only adventure there are no castles to assault or valleys to negotiate. The only climbing you have to do is the social type. The object of the game is not a simple



# REVIEWS

## GAMES

one. Just getting to Hampstead isn't too difficult. The trick is to 'arrive', with all the success and status which that implies. You must become a Hampstead person!

Unfortunately, the programmers don't make life easy for you. You start off in a grisly apartment, knee deep in fungi and discarded take-away cartons, in a less salubrious area of north-east London.

Your first arduous task is to get dressed and out of the house without being mugged. Should you make the mistake of simply walking out the back gate you are tartly informed that you will never attain Hampstead status without transport.

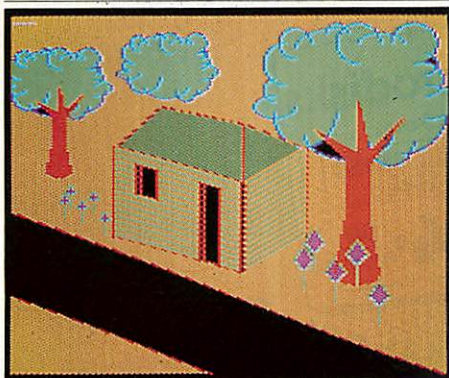
Next comes the marginally less awkward task of collecting your dole cheque and cashing it in. Along the way there are plenty of wonderfully corny jokes and all too realistic descriptions of modern London life. I especially liked the queue in the dole office which seems to take forever to move.

Everything about the game is unconventional. *Hampstead* is the only adventure I know with commands like Marry and Kiss. Furthermore, there aren't many adventures where a Sony Walkman is considered an essential object. You can lie, steal, cheat and defraud to get to NW3.

The scenario and the text are well up to Melbourne House's usual high standards.

Steve Mansfield

### FROM HERE TO KINGDOM COME

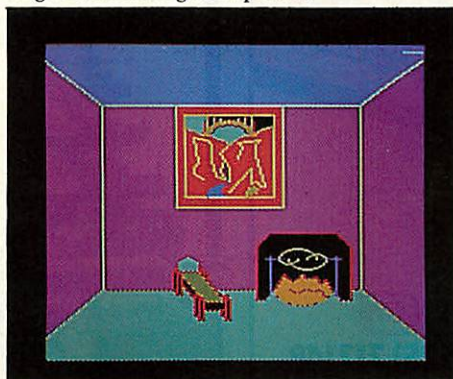


'Twin Kingdom Valley', Bug Byte, BBC micro/Electron, £2.95 (cassette)

This is a traditional adventure game, set in a mythical valley in which reside, as you might have guessed, two kings, who aren't exactly on the best of terms.

You play the classic adventure stereotype –

an adventurous, bounty hunting, greedy human. Survive long enough, and you'll discover 175 illustrated locations, and 35 creatures, each with its own current strength, maximum strength, carrying capacity, and unattractive personality. You've been set an objective, too, though it's only the rather unimaginative target of amassing 1024 points.



Helped, no doubt, by the low price tag, *Twin Kingdom Valley* seems to have already caught the imagination of many players, since I've come across hints and tips on the game in several software magazines. It's just as well, as without them and Bug Byte's own help sheet, I wouldn't have got far. To be honest, I still haven't got far!

I wish software houses would give an approximate level of difficulty for their adventures, to save baffling beginners and frustrating aficionados. Bug Byte haven't done so here, so I'll now declare that this game is difficult.

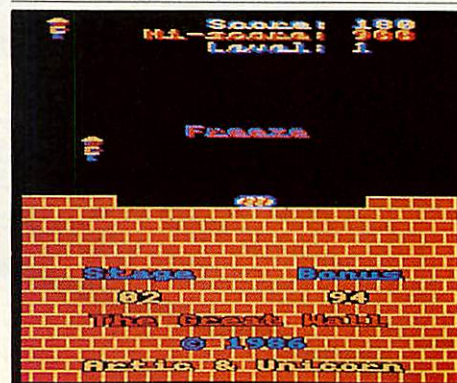
Two particular problems I encountered occurred at the beginning and the end of each game. I found it very hard to get going, and spent a lot of time wandering along forest paths, past endless babbling brooks, meeting just the odd unarmed gorilla. Then, when something dreadful happens, and I'm sent to meet my maker, I find there's no way of restarting without reloading the whole game. A surprising shortcoming in an otherwise sophisticated package.

Keyboard response is excellent. The program accepts anything from whole sentences to single letters, and responds quickly. Six display options, available throughout each game, determine if and when graphics are shown and the length of location descriptions, allowing players to customise the game to their style and experience.

I'd call this game a very attractively written challenge for the experienced adventurer.

Bernard Emblem

### THE NOT SO GREAT WALL



'The Great Wall', Artic Computing Ltd, BBC B/Electron, £1.99 (cassette)

*The Great Wall* is a game set in days of old when battles raged and you as an army runner, are vital in keeping the communication lines open. At least that's what the game's inlay card tells you. In reality the game is an implementation of the popular *Hunch Back* game and a very poor one at that.

It is your job to guide the runner across the screen dealing with a variety of hazards such as rocks being hurled at you, battlements to jump over, pits to be got across and particularly vicious soldiers with sharp pikes!

The game boasts eight skill levels each containing 64 of these sections – 512 sections in all – and a choice of four accompanying background tunes.

The game runs in screen mode five, restricting the display to just three colours on a black backdrop, giving rise to a very bland and boring background on which to play. The character animation is amateurish. Some of the game objects, particularly the rocks, move an entire character square at a time resulting in very jerky movement. Screen flicker is also evident.

The collision checking between screen objects leaves a great deal to be desired. I often thought I was a gonner only to discover the threatening nasty would pass straight through my character with no apparent ill effects. Conversely, on other occasions the mere presence of a rock some distance away brought on a premature attack of death.

This is the type of game that was around when the BBC was first launched and software was scarce. It is both unoriginal and poorly written and has very little to offer.

Mike Ginns



## USE ASSEMBLER CODE?

Nobody makes a better BBC Cross Assembler than us and that's official. (Read the review in this issue.)

6301	6303	6305
6800	6801	6802
6803	6804	6805
6808	6809	68HC11
68000	65XX	65CXX
65C812	670	

In fact no-one  
even comes close!

## 'AMNESTY' OFFER!

CRASH BARRIER ARE RUNNING A SPECIAL OFFER FROM SEPTEMBER THROUGH OCTOBER ONLY: SEND US YOUR OLD ROMAS' OR 'CROSSWARE' ASSEMBLER FOR A £35 REBATE ON A CRASH BARRIER METAASSEMBLER!

6301 6303 6305  
6800 6801 6802  
6803 6804 6805  
6808 6809 68HC11  
68000 65XX 65CXX  
65C812 670



(0525) 717148



(0525) 717148

CRASH BARRIER · FREEPOST · FLITWICK · BEDFORD · MK45 1YP

# SINK THE BISMARCK

A WARGAME SIMULATING A MAJOR ACTION OF WORLD WAR II

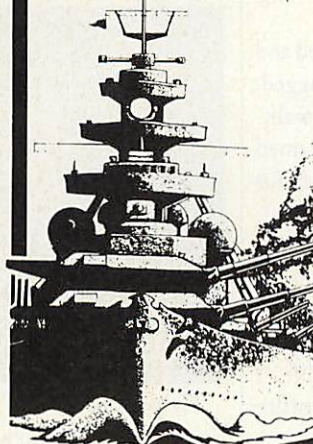
'Sink The Bismarck' is the first of a new generation of wargames for the BBC Micro with a single disc-drive. The game is split into several sections, each of which is loaded as and when required by the main battle program. The game comprises some 40K of code, which still runs on a BBC B in hi-resolution graphics mode.

'Sink The Bismarck' is an accurate simulation of conditions in the North Atlantic in May 1941, including U-boats to harass your battleships, weather and fuel considerations, and troop and supply convoys which you must protect from the German battleship, which was regarded as the most powerful vessel afloat at the time. You have twelve British ships, each with their own strengths and weaknesses with which to scour the North Atlantic 1500 miles wide!

The program is compatible with the BBC B, B+ 64K, B+ 128K and MASTER 128 machines, and with the Acorn DFS, Watford DFS/DDFS, Opus DDOS, Solidisk DFS and the ADFS, and should be compatible with all other systems.

FOR  
BBC B  
with  
DISK

£10.99  
plus £1.00p&p



Available from: Design People Software,  
77 Grimwade Street, Ipswich, Suffolk  
IP4 1LN or from good distributors.

## Compumart

5 1/4" Disks  
FREE!!

5 1/4" Disks		FREE-PRICE-FREE
Quality 5 1/4" Blank Disks		Plastic Library Case Free with Ten Disks
10 Single Sided Double Density	£9.95 +£1p.p	+2 FREE Disks
10 Double Sided Double Density	£13.95 +£1p.p	Perspex Storage Box Free with Fifty Disks
50 Single Sided Double Density	£49.95 +£2p.p	+10 FREE Disks
50 Double Sided Double Density	£69.95 +£2p.p	Hub Rings, Envelopes, Labels etc

10-AMSOFT  
3"CF2 Microdisks  
ONLY £32.00  
+£1p&p

SAVEEEES  
FREE DISKS  
With every 10-5 1/4" DISKS  
Buy 10 GET 12  
50 GET 60

TOP  
Quality 3 1/2" Microdisks  
BOXED IN 10's - LABELS etc....

SINGLE SIDED 135 T.R.I.	DOUBLE SIDED 135 T.R.I.
£19.00 +£1p&p	£24.00 +£1p&p



Same Day  
Despatch On ALL  
Orders Before 4pm  
ALL Prices Inc. VAT

24 Hour Credit Card  
Order Line  
0509-233893



Please send cheques/postal orders to:

Compumart, (Dept ACO)  
Unit 8, Falcon Street, Loughborough,  
Leics, LE11 1EH

Compumart  
0509-262259  
HOTLINE





# REVIEWS

## R O M S

# CROSSING THE DIVIDE

Simon Williams compares three cross assemblers

A cross assembler is a utility which allows you to write and assemble machine code. Unlike an ordinary assembler, however, a cross one lets you write code for a processor other than the one in your computer. You can't, of course, run the machine code without transferring it to a micro with the right processor, but if you only have limited access to the 'target' computer, a cross assembler allows you to do most of the development on one machine; in this case a BBC micro.

With the selection of cross assemblers under review here you could write code for a Master 128 (65C02), Spectrum or Amstrad (Z80), Dragon (6809) or Atari ST (68000), among many others.

### Crossware

The *Crossware* package consists of a 16k ROM, utilities disc and thin manual. Each chip only caters for one processor family and works symbiotically with the resident Basic operating system. This means that you work in the normal 6502 assembler environment, but using instruction mnemonics for the new target processor, rather than the 6502. To tell the *Crossware* ROM what you're doing, you simply use the command \*MCODE before starting your assembler program, rather than the usual opening square bracket.

The *Crossware* assembler can save sections of code to disc as Basic procedures, and will then supplement Basic's own search routine when a procedure is called from within a program. If the procedure isn't found in memory, *Crossware* will search for a file with the procedure's name in the 'P' library of the selected drive. If found, the code of the procedure is overlayed into memory, executed and then removed again.

The assembler supports disc-to-disc assembly, and offers the pseudo-operations OPT, EQUW, EQUW, EQUW and EQUW. It can handle code overlays, as described, as well as assembling from a contiguous section of program in memory.

### Romas

This cross assembler copes with nine target processors, all eight bit, with three of the instruction sets included in the 16k ROM and the other six loaded as overlays from the sup-

```
1450 4FAF EC 88 05
1460 4FB2 E4 88 05
1470 4FB5 CC 88 05
1480 4FB8 3F
1490 4FB9 BE
1500 4FBA DD BE 05
1510 4FBD FD BE 05
1520 4FC0 BF
1530 4FC1 B8
1540 4FC2 B9
1550 4FC3 BA
1560 4FC4 BB
1570 4FC5 BC
1580 4FC6 BD
1590 4FC7 FE 20
1600 4FC9 ED A9
1610 4FCB ED B9
1620 4FCD ED A1
1630 4FCF ED B1
1640 4FD1 2F
1650 4FD2 27
1660 4FD3 35
1670 4FD4 DD 35 05
1680 4FD7 FD 35 05
1690 4FDA 3D
```

```
CALL PE,NN
CALL PO,NN
CALL Z,NN
CCF
CP (HL)
CP (IX+IND)
CP (IY+IND)
CP A
CP B
CP C
CP D
CP E
CP H
CP L
CP N
CPD
CPDR
CPI
CPIR
CPL
DAA
DEC (HL)
DEC (IX+IND)
DEC (IY+IND)
DEC A
```

### Assembling Z80 code from a BBC micro

plied utilities disc. A 160-page A5 manual completes the package, and is clearly written, with most aspects of *Romas* operation covered with illustrative examples.

*Romas* provides its own, full-screen editor which works happily in any mode. Text lines can be up to 250 characters long, and the screen will scroll along them. The top four lines of the editor are used for commands and to display status information, the rest of the screen being devoted to the text of your program.

The editor commands are all of one or two characters and provide very comprehensive control of the cursor and text. I don't know when I've seen more copious movement and deletion commands.

The editor will also search your source text, replace sections either globally or selectively, and supports wild cards.

The editor will handle macros. This means that you can assign a string of commands to a particular key sequence and call those commands by pressing the relevant keys. It is very similar to the macros available with *View*, but should not be confused with a macro assemb-

ler, such as *Meta*. The *Romas* assembler offers 22 different directives, including conditional assembly via the IF, THEN and ELSE statements. Using these commands you can instruct the assembler only to assemble particular sections of code if certain conditions are met. This is very useful when you want to include test code for debugging your assembler program.

As well as the editor and assembler, *Romas* includes a number of extra facilities called with \*commands. These include Intel standard file converters, a file locator, a cross referencer for your source code and simplified file transmission and reception commands for use with the RS423 port.

A 6502 disassembler is provided on disc to experiment with, both as a utility and as a piece of sample source code.

### Meta

Crash Barrier's cross assembler is a very comprehensive beastie. It arrives as 24k of code in two ROMs, a disc and an A4 loose leaf file running to 54 pages. It copes with a staggering





## SPECIAL OFFERS

**BBC MASTER 128 COMPUTER £391 + VAT = £449.65 (carr. £8)**  
**With FREE £5 Voucher for use with any other hardware purchase!**  
**Akhter UFD top quality Disk Drives – 40/80 Track switchable**

– Complete with bound handbook and **FREE BBC Utilities disk** and written **2 YEAR WARRANTY**, – Fantastic Value!

MD400A	Single	400k	No mains PSU	£118.00
MD400B	Single	400k	with PSU	£135.00
MD802C	Dual	800k	No mains PSU	£215.00 (carr. £4)
MD802E	Dual	800k	with PSU	£245.00
MD802DM	Dual	800k	in Monitor Stand	£265.00

(Education Users send for **FREE Colour Catalogue + Price List**)

### Cumana Disk Drives:

CSX400	Single	400k	No PSU	£144.90
CS400	Single	400k	with PSU	£162.15 (carr. £4)
CD800	Dual	800k	with PSU	£281.95

Microvitec Monitor 1451 high res. £258.75 (carr. £8)

### Printer Bargains for Electron/BBC/Master

Seikosha GP-500 (10" Tractor feed)	£93.75
Centronics GLP (NLQ) with <b>FREE</b> Tractor Feed and <b>FREE</b> BBC Parallel Cable	£125.95
Mannesmann Tally MT80+	£186.00 (carr. £6)
Epson RX100+ (132 column)	£251.95
Juki 6100 Daisy Wheel	£235.75
Star NL-10 Fine NLQ printer, complete with Tractor Feed 5k buffer, Automatic Single Sheet Feeder, Touch Controls and Parallel Interface Cartridge	£239.00
BBC Parallel Printer Cable	£8.25

**PACE Nightingale Modem Plus Commstar ROM + Cable £124.20**

**ALL PRICE INCLUDE VAT**

### TIGER SOFTWARE

**66 ST. MICHAELS LANE, BRIDPORT, DORSET, DT6 3RB**  
**Tel: 0308 27691**



## Can I try Elite now?

Our staff are well trained and friendly, and fully prepared to answer all your queries about our wide range of software and hardware. We are official Acorn dealers and take pride in efficient and friendly service. By the way, Tristan, the cuddly dog in the 'photo is an expert of Sabre Wulf.

**NUMBER ONE IN BROMLEY**

# Data Store

6 Chatterton Road, Bromley, Kent. 460 8991

AA55

## 0664 63617 Squirrel's Byte

### RIBBONS

Shinwa	3.45	Epson FX/RX/MX80	2.99
Kaga KP810	3.45	Epson FX/RX100	4.50
Canon PW1080a	3.45	Epson LX80	2.99
Juki 6100 s/s	1.45	Seikosha GP80/100/250	2.99
Brother HR15	3.00	Walters WM2000	3.85
Star NL10	4.99	Amstrad DMP 2000	4.78
Star SG10	2.45	Centronics GLP	3.20

— Many other ribbons available — please ring —

Printer Cables 1.5m	6.75	2 metres	7.75
---------------------	------	----------	------

### PAPER & LABELS

2000 sheets per box		Price per 1000 labels	
Exact A4 70gsm	16.75	3.5" x 1.5" 2 across	5.99
11 x 9.5" 60gsm	12.99	2.75" x 1.5" 2 across	5.39
12 x 9.25" 60gsm	14.99	2.75" x 1.5" 3 across	5.39

### 5.25" DISKETTES

(100% guaranteed)		Prices per box of 10	
SS DD 48tpi	7.95	VERBATIM DATALIFE	13.45
DS DD 48tpi	8.95		17.45
SS DD 96tpi	11.95		18.45
DS DD 96tpi	13.95		21.95

### Disk Storage

SEE-10 (10 x 5.25")	1.75	Lockable Box (70 x 5.25")	10.95
---------------------	------	---------------------------	-------

### DISK DRIVE SERVICING/REPAIR

Rates for service/recalibration and minor repairs, inclusive of VAT and return P&P:

Single Drives	£25.00	Dual Drives	£30.00
---------------	--------	-------------	--------

**ALL PRICES INCLUDE CARRIAGE BUT NOT VAT.**  
**Please telephone if you do not see the item you require.**

### Squirrel's Byte

**7 Coniston Road, Melton Mowbray,**  
**Leicestershire, LE13 ONE. Tel: (0664) 63617**



## GPD Systems

### COMPUTERS

	exc. VAT	inc. VAT
BBC MASTER	£394	£453.10
BBC+ 64K (price subject to availability)	£350	£402.50
Master 'Compact' New BBC system with integral 3.5" disc and separate keyboard	£399	£458.85
Amstrad 8256	£390	£448.50
Amstrad 8512	£490	£563.50

### DISC DRIVES

2 year guarantee 40/80 switchable

#### Without PSU

Single 400K DS	£96	£110.40
Dual 800K DS	£183	£210.45

#### With PSU

Single 400K DS	£112	£128.80
Dual 800K DS	£205	£235.75

Dual 800K horizontally mounted in a monitor stand.

Fits both the BBC and Master series

Low cost drives 1 year guarantee	£245	£281.75
----------------------------------	------	---------

Single 400K DS Without PSU

Dual 800K DS Without PSU	£85	£97.75
--------------------------	-----	--------

Single 400K DS With PSU	£168	£193.20
-------------------------	------	---------

Single 400K DS With PSU	£101	£116.15
-------------------------	------	---------

### MONITORS

Phillips 8533 medium resolution colour	£249	£286.35
--	------	---------

Phillips TV/Monitor	£172	£197.80
---------------------	------	---------

### PRINTERS

Star NL10 30cps NLQ 120cps Draft	£225	£258.75
----------------------------------	------	---------

Taxan KP 810	£245	£281.75
--------------	------	---------

Juki 6100 Daisywheel	£235	£270.25
----------------------	------	---------

Discount for quantity purchases.

Educational orders welcome.

Computers, Monitors, Disk drives, Diskettes, Software, CAL, CAD, Education & Business. Repairs to Micros, Diskdrives. Monitors and to all Laboratory Electronic equipment. Wordprocessing supplies. Systems & tuition.

Part exchanges and updates on any system. Computer assisted learning & design software. Complete range of BBC software & add ons. Education & Export orders welcome. Part post and packing £4.00. Diskettes £1.00

### Mail Order Only.

**31 Abbey Road, Billericay, Essex CM12 9NF.**  
**Tel: (02774) 51443**



# REVIEWS

## R O M S

17 different families of processor, including the 16 bit 68000. It's written in such a way that extra processors can be added to the list by incorporating their instruction sets into the assembler, so there's no reason why further 16 or 32 bit chips cannot be spliced in.

*Meta's* editor is a *Wordwise*-style mode 7 screen editor, which uses coloured highlighting to distinguish between assembler statements, comments and the current cursor line. It uses a clever technique of wrapping single lines of code around the 40 column screen so you can still work with long commented lines if you wish.

All the features you would expect to find in a good source code editor are present; byte count, search and replace, block movement. There are also a few extras, such as the ability to work in decimal or hex, and a comprehensive function evaluator which can be used in immediate mode as well as during assembly. You can also drop bars into your program to separate different sections of code, and move between them using the Find Bar function.

The *Meta* assembler supports modules, which are much like assembly-time macros. This means you can give sections of code a name and then refer to that name throughout

sional feel. Another option from the main menu is a serial communicator. This sub-program deals with importing and exporting object code via the RS423 port, and offers handy functions like stripping out all control codes in an imported program, so they don't send your micro haywire.

### Portal

All this cross-assembly is fine, but how do you get the assembled code from your micro, or its disc, into the target machine? There are various ways, most of which involve a serial connection between the two machines, but

requirements are. If you feel you're only ever likely to write for one other processor on your BBC micro, then you may well feel the single-target assemblers offered by Crossware are your best solution. They are certainly easy to use, with few new editing or assembly commands to learn. They do seem a bit on the expensive side, though.

Watford's *Romas* is a good all-rounder, offering a wide selection of eight bit target processors, a number of useful directives, and a macro editor which will work in both 40 and 80 column modes. The extra \* commands provided will also be useful and the price of

Editor	Crossware	Romas	Meta
Facilities	3	5	4
Ease of use	3	3	5
Assembler			
Macros	Proc overlays	Editor only	Yes
No. of directives	5	22	35
Conditional assembly	No	Yes	Yes
No. of 8/16 bit families supported	6/1*	9/0	16/1+
Other features	2	4	5
Documentation	2	5	5
Key: 5 - very good; 4 - good; 3 - fair; 2 - poor; 1 - lousy			
*Each target processor on a separate ROM, + Designed to have extra instruction sets 'grafted on'			

Table-1. Comparative cross assembler features

Crash Barrier's Portal is a particularly clever solution which, once fitted, allows code to be transferred freely from your BBC micro to the target machine.

A Portal consists of a dil header socket sandwiched between two small circuit boards. These boards hold a quantity of fast dynamic RAM and the necessary decoding circuitry to load the RAM with machine code from your BBC micro, via its user port. The dil socket is connected into any EPROM socket on the target machine and appears to that machine as one of its own EPROMs. Thus the code that you've written can be run immediately on the target machine, and updated from the BBC micro in a couple of seconds, if it needs to be altered.

Portals come in two configurations: the 128 and 512 models. The 128 can emulate 2716 (4k), 2732 (8k), 2764 (16k) and 27128 (32k) EPROMs, while the 512 can also imitate 27256 (64k) and 27512 (128k) chips. To anyone who does a lot of cross assembly, a Portal could stop an assembler being quite so cross!

When you are spoilt for choice, as in this case, you really have to decide what your exact

the complete package seems very competitive in my opinion.

The *Meta* assembler lives in a different world. It is structured to work with any new processor coming onto the market, as new instruction sets can be added as needed. It has a well-featured editor with colour highlighting, a sound modular approach to program creation and a useful serial communicator (like a sawn-off *Commstar*).

The Portal is an elegant solution to the problem of code transfer to the target machine, and although the overall price of the system may restrict its use to commercial or educational buyers, it must really be considered the state of the art.

'Z80XR/68000'XR', Crossware Products, 2 The Lawns, Melbourn, Royston, Herts SG8 6BA, Tel: (0763) 61539, £48/£56

'Romas', Watford Electronics, Jessa House, 250 Lower High Street, Watford, Herts, Tel: (0923) 37774, £51.75

'Meta', Crash Barrier, Freeport, Flitwick, Bedford MK45 1YP, Tel: (0525) 717148, £145

'Portal 128', Crash Barrier, both distributed by Technomatic, £100

```

BRR LABEL1
660 00000092 61 E4
BSR LABEL1
670 00000094 60 E2
BVC LABEL1
680 00000096 69 E0
BUS LABEL1
690 00000098 64 7E
BCC LABEL2
700 0000009A 63 7C
BCS LABEL2
710 0000009C 67 7A
BEQ LABEL2
720 0000009E 6C 78
BOE LABEL2
730 000000A0 6E 76
BGT LABEL2
740 000000A2 62 74
BHI LABEL2
750 000000A4 6F 72
BLE LABEL2
760 000000A6 63 70
BLS LABEL2
770 000000A8 6D 6E
BLT LABEL2

```

### A BBC micro assembles 68000 code

your program. The assembler will then replace each occurrence of the name with the corresponding code segment. This is not the same as using sub-routines, as the finished program will be as long as it would without macros, but it does serve as a very useful shorthand and makes your source listings much more readable.

The assembler itself is selected from the editor's main menu and the directives supplied allow you to send the object code to disc, printer, user port, serial port, sideways RAM or to a Portal and in any of six processor formats. The whole system has a very profes-



# COULD YOU USE 16 COLOURS IN MODE 2?

- ★ Choose from a palette of 4096 selectable colours
- ★ Colours range from sharp contrasts to subtle shades
- ★ Hundreds of new colours available
- ★ The palette is simple to program using VDU 19 from either BBC Basic or Machine Code
- ★ Ideal for dramatic special effects in games, video presentations and many other applications
- ★ Easy fit board plugs inside the BBC Micro without soldering
- ★ Use in all modes

The Wild Vision Palettemate colour graphics card is a unique idea which greatly enhances capabilities of the BBC Micro. The actual displayed colours in any mode can be replaced with a selection from the palette of 4096, giving a staggering 16 separate colours in Mode 2. Moreover, the selection can be rapidly reprogrammed to give very dramatic effects. The system is very easy to install and connects to the linear inputs of an RGB Monitor via the standard connector at the rear of the BBC. A package of demonstration software and instructions is included.

Palettemate Graphics Card ... **£99**  
incl Carriage and VAT

Wild Vision also produce the Hawk V8 Image Processing System for the BBC Micro. Its highly innovative design enables the BBC Micro to grab and process single video frames in real time, though it costs far less than similar systems.

Hawk V8 Image Processing System from **£925.00**



Applications include:

- ★ Medical imaging
- ★ Video measuring
- ★ Industrial automation
- ★ Scientific image analysis, microscopics
- ★ Robotic control
- ★ Graphics and CAD
- ★ Optical character recognition
- ★ And many more

## Wild Vision

6 JESMOND ROAD · NEWCASTLE UPON TYNE · NE2 4PQ · TEL: 091 281 8481 · TELEX: 537038

If YOU ever key **CHAIN, LOAD, \*RUN, \*ACCESS, \*LOAD, \*COPY, \*DELETE, \*COMPACT, \*INFO, \*TYPE, \*DUMP** or **\*EXEC**, then **YOU** need ...



### DISC MENU FACILITIES

Three menus available, Load menu, Run menu, and Disk Free Space display. All Menus are mode 7 colour displays accessible using a \* command, or more efficiently using L/Break, M/Break and O/Break.

Menus are 'networked', switch between them at the touch of a key.

Load menu loads BASIC programs and automatically lists them with page mode set on - with a single keystroke! However, if you have The Acorn BASIC Editor Rom in your machine, it is entered with insert mode set.

Load menu also loads machine code programs at the correct address for subsequent disassembly. Automatically detects a Rom and prompts for a destination Ram socket.

Touch the COPY key and invoke the Copy menu. Select the files, select the target drive, and BEEBAID does the rest for you. Handles duplicate files, locked files and multiple destination drives.

The Run menu enables BASIC and machine code programs to be executed easily - by all the family! Supersedes all other well known Run menus - B, B+, Master and Tube compatible.

Disk Free Space Display shows the size of all files on a disk and the location of the free space. Touch a key to swap between hex and decimal. Hit 'C' for automatic compact.



For

### ROM CONTROL AND MANAGEMENT

Elegant mode 7 colour display of Rom/Ram sockets showing Rom title and read/write/disable status. Switch Roms off and on - permanently for users of battery backed Ram - even across a power off! (Like the Master Series).

Copy Roms to disk by name or socket number.

Transfer any Rom to sideways Ram.

Query read/write/disable status of Rom/Ram sockets.

Handles multiple sideways Ram sockets.

Tested with ATPL, Solidisk, Watford and Acorn User Ram extensions.

### \*DISK FILE INDEXING SYSTEM

In addition to all the facilities already listed, the BEEBAID Rom is supplied with a Disk File Indexing system. This system automatically maintains an index of all your software and allows you to categorise your programs, eg. Games, Educational, Simulation etc. It can be dynamically tailored to your own requirements, eg. your disk drive configuration and which directories you want to index. The Index may be searched by program name, disk number or category. It is supplied on a 40/80 compatible disk with its own bound manual and it is FREE!



### POWER UP OPTIONS

Permanent cure for screen jitter in graphics modes - essential if you've spent a fortune on a monitor! HI-BASIC automatically selected when 6502 second processor active.

Shift key switched for ease of keying lower case BASIC variable names.

Increases the speed of that slow keyboard by 30%! Automatically prevents disks being permanently disabled by some games - no need for power off.

### \*AND MUCH MORE

Dump the current text window to the printer with \*DTWindow.

Zeroise memory segments using \*ERASE commands, including selectable Ram sockets.

Turn the Tube on and off using \*TUBEON and \*TUBEOFF. Preserves status of text or programs held in second processor.

Relocate any memory segment with \*SHIFT.

Relocate any BASIC program with \*MOVE.

Disable the Econet system using \*NONET.

Load a program to the correct address using \*DOWNLOAD.

Enhance your BBC Micro with some 20 additional Break commands.

Please send me ..... BEEBAID packages comprising 16K Rom, 40/80 compatible disk and 2 manuals at £34 inclusive. I enclose a cheque/postal order for £ .....

Name .....

Address .....

.....

.....

.....

.....

Order despatched by return of post.

BEEBAID is fully 6502 second processor compatible and has been tested on model B, B+ 128 and Master Series machines using the Acorn DFS. It has been tested with several sideways Ram boards including ATPL, Watford, Solidisk and Acorn User, using single and multiple Ram sockets. It has also been compatibility tested with many other Roms.

To order your copy of BEEBAID, simply fill in the cutout and send it with a cheque or postal order payable to:

**JAYSOFT** at: For technical enquiries please call 01-462 8453 (7-9pm)

**114 KINGSWAY, WEST WICKHAM,  
KENT BR4 9JQ**



# REVIEWS

## S O F T W A R E

# SWIFT SPREADS ITS WINGS

Roger Carus puts the Swift spreadsheet through its paces

On first examination I thought that I was going to be enthusiastic about this spreadsheet as it has some unusual features which were welcome – notably a series of ‘pop-up’ menus which control functions; a split screen facility and some useful illustrative examples. However, not everything on this package lived up to expectations.

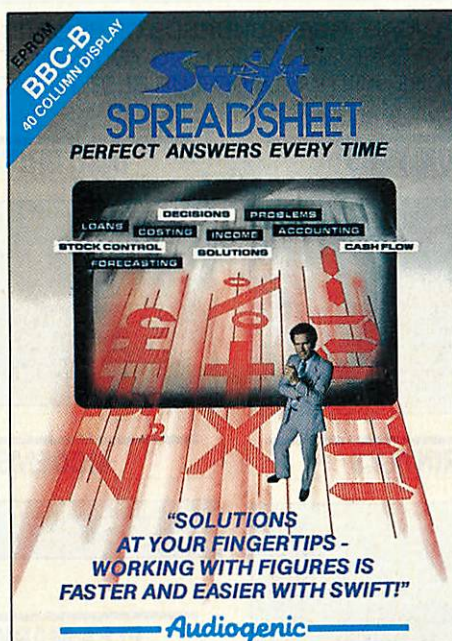
The package comes in the usual small box and is well presented. At the heart of the system is a 16k EPROM (version 2.2) which comes with a 52-page instruction manual, a plain cardboard reference card, advice on installation and a function key strip. The examples came in the form of a cassette with four ‘templates’ or typical sheets ready for use.

Fitting the EPROM was made more difficult by the fact that the adhesive label with the name had been wound right round the ends of the chip and it was difficult to be sure which end had the groove.

Then, like any proud new owner, I started to do some serious reading of the manual and discovered that it had been written for the Commodore 64, except for the frontsheet. There are several versions of the chip, designed for the Commodore and Atari ranges of micros. There are also separate versions for the BBC B offering 40 or 80 column screen displays. The version tested was the 40 column type which would be best for those who use a domestic TV rather than a monitor. I have no idea why the programmer did not allow a choice within one chip.

In actual operation there is very little to choose between different spreadsheets and the system of naming the cells in columns A to Z and rows 1 to 126 is standard. The actual number of boxes this produces is 3276 which is quite sufficient for most purposes and about as much as the memory will support. The entry of arithmetical instructions were the usual ones. The one thing about entries which I did not like, was the need to express the addition of two cells as +A1+B1 compared with the more normal A1+B1 used on most spreadsheets. The extra + is time consuming and unnecessary.

I very much liked the ‘pop-up’ menus which have not been available on any of the eight spreadsheets for the BBC micro which I have used. When using the sheet for con-



structing a model, at the touch of f5 a menu is superimposed on the screen without disturbing the calculations offering a choice of commands. So for example the main ‘Command Menu’ offers:

- Exit
- Range commands
- Worksheet commands
- Format cell
- Column-width
- Split screen
- Recalculation
- Disc commands
- Free space 10750 (the maximum).

You can then use the cursor to highlight your choice and bring up a sub menu on top of the first so as to get, for example the ‘Worksheet Commands’:

- Exit
- Global format
- Sheet column-width
- Delete row/col
- Insert row/col
- Save sheet
- Load sheet
- Printer set-up
- Change colour
- Formula or value
- Clear sheet

This can be repeated with a large number of sub menus which saves time and reduces mistakes made.

The other distinctive and excellent feature which the system offers is the ability to provide ‘windows’ by using the command ‘Split Screen’ and so either have headings fixed while data is entered or processed or even better to construct a window on a few key entries while working.

In fact I preferred this particular method to that used by *ViewSheet* which made it top choice in an earlier review.

My tests started by loading each of the examples provided from the cassette – and I wonder what proportion of users have still to change to discs? They ran beautifully and gave me a favourable impression of the package, although I think that overall entries may perhaps be a little bit slower to make – but nothing significant.

Then I tried two of the standard sheets that I use with each package to allow comparisons, and saved each to disc. Finally, I shut the system down, began again to load my sheets and obtained an ‘Illegal Character’ message! Thinking I had done something stupid I transferred the samples from cassette to disc and achieved the same result.

In fact mistakes were impossible as the system goes through the Command menu to the Worksheet menu, and then to ‘Load’ which shows up the current list of *Swift* files (in Directory ‘G’), so mistakes are impossible. My problem lay in having a Watford Disc Filing System (DFS). It worked well on a more basic micro which uses an Acorn DFS. I still cannot understand it, because there are no characters other than ‘G’ and the file names consisted entirely of letters.

I understand that later production models of the chip will allow use by the Watford DFS.

This is a good package marred by a few faults which are unnecessary. For overall value, I give *Swift* five out of ten. If only Dave Middleton who wrote the program had tried out some of the earlier rivals and borrowed their best features!

Generally, a useful ROM-based system with some excellent features but be sure it is compatible with your DFS.

*‘Swift Spreadsheet’*, Audiogenic Software Ltd, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire, Tel: (0734) 30366, BBC B with cassette or disc, £29.95





PHONE FOR OUR FREE EXTENSIVE CATALOGUE. HUNDREDS OF PRODUCTS LISTED AT EXCELLENT PRICES. FLEXIBILITY IS OUR WATCHWORD. IF THERE IS SOMETHING YOU WANT THAT'S NOT LISTED OR YOU NEED THAT SPECIAL DEAL, JUST PHONE, AND WE'LL DO OUR BEST TO SATISFY YOUR REQUIREMENTS.

Master128	£399.00
Master128	£325.00
Master ecom module	£31.47
Turbo board	£108.00
64k upgrade kit	£34.74
Z80 2nd processor with software	£346.00
6502 2nd processor	£173.00
10 Mbyte Hard disc with fileserver	£1086.95
32 Mbyte Hard disc with fileserver	£1608.95
Telexnet receiver	£159.00
Prestel receiver	£120.00
Eprom cartridges	£13.00
Acorn DNFS kit	£82.60
1700 upgrade kit	£43.42
ADFS ROM	£26.04
ATPL Sideways RAM/ROM board	£10.00
View manual	£10.00
Viewsheet manual	£10.00

<b>Mono:</b>	
Sanyo DM4112	<b>£75.00</b>
Philips green Hi-res 7502	<b>£76.00</b>
Philips magenta Hi-res 7522	<b>£92.00</b>
Zenith green	<b>£80.00</b>
Zenith amber	<b>£85.00</b>
<b>Colour:</b>	
Microvitec std-res 1431	<b>£199.00</b>
Microvitec med-res 1451	<b>£235.00</b>
Microvitec hi-res 1451	<b>£410.00</b>
Philips B530 RGB Med-res + Composite video	<b>£251.00</b>
Monitor cables (state type required)	<b>£3.50</b>
Monitor bridge single height	<b>£14.90</b>
double height	<b>£18.90</b>

Opus 5401 100k S5 40/track	\$69.52
Opus 5802 400k D5 40/80/track	\$122.00
Opus 5802DB dual 400k D5 40/80/track	\$239.00
Opus 5802D dual 400k D5 40/80 with PSU	\$274.00
Opus Challenger	\$216.00
Pace PSDIP 100k 40T with PSU	\$125.00
Pace PSD3P 400k 40/80T with PSU	\$144.00
Pace PD0P dual 400k 40/80T with PSU	\$260.00
Aktrio MB02E dual 400k D5 40/80T mounted in monitor stand	\$266.00
Cumana CS100 100k S5 40T with PSU	\$112.00
Cumana CS400S 400k D5 40/80T with PSU	\$152.00
Cumana CD800S dual 400k S5 40T with PSU	\$282.00

Listing Paper	
11 x 9.5 (2000 sheets)	£11.50
11 x 14.5 (2000 sheets)	£14.50
Labels 100(90 x 36mm)l across	£4.99
Ribbons for Epson FX/RX/MX80	£4.50
Computer maintenance kit	£13.50

PCW8256	£399.00
PCW8512	£499.00
2nd disc drive for PCW8256	£155.00
Serial interface for PCW	£59.00
Modem with Chat Chat software	£169.00
Wordstar deluxe	£60.00
Supercalc	£43.00
Sagesoft Popular Accounts Plus	£130.00
Base II	£103.00
3 inch discs for PCW's	£4.20

Dot Matrix	
Epson LX80	\$199.00
Epson FX85	\$318.00
Epson FX105	\$430.00
Epson LX80 tractor unit	\$20.00
Olivetti DM100 80cpl NLQ 120cps	\$225.00
Olivetti DM280 80cpl NLQ 160cps	\$349.00
Canon A50 NLQ 80cpl 180cps draft	EPQA
Canon A55 NLQ 156cpl 180cps draft	EPQA
Daisy Wheels	
Sanyo PR3000	\$199.00
Sanyo PR5200	\$299.00
Juki 6100	\$346.95
Brother Hrr15	\$349.00

Nightingale with Commstar .....	£135.00
Voyager 11 .....	£99.95
WS 2000 .....	£108.95

<b>Acorn:</b>	
View 2.1	\$45.00
View 3.0	\$63.00
GXP (please state whether for B or B+)	\$23.00
ISO Pascal	\$52.00
LISP	\$39.00
LOGO	\$52.00
Logo	\$52.00
Viewsheet	\$45.00
Viewstore	\$45.00
ADFS	\$26.04
<b>Computer Concepts:</b>	
Wordwise Plus	\$40.00
Printmaster	\$25.00
Accelerator	\$48.00
Speech ROM	\$27.50
Communicator	\$51.30
Interchart	\$48.00
Interchart	\$26.50
<b>Beebugsoft:</b>	
Toolkit Plus	\$33.00
Wordase	\$25.00
ICON master	\$29.00
ROMIT	\$29.00
Help II ROM	\$27.00
Slueth ROM	\$27.00
Exmon II	\$32.00
Spellcheck III	\$28.00
MACOM	\$24.00
<b>Pace:</b>	
Commstar	\$29.57

BBC Master (integral View and Viewsheel)  
with hi-res monitor, daisywheel printer,  
1.2 Mbyte dual floppy disc drive ..... **£909.00**  
Sanyo MBC555-2 with monitor, LX80 printer,  
Wordstar, Calcstar, Infostar, Mailmerge  
and full accounting package ..... **£2909.00**  
Or tell us your requirements and we will  
make up a system for you.

Please state whether for BBC or Master	
AMX mouse with Super Art ROM	£78.00
Pagemaker	£43.43
Paintpot	£13.00
Desk	£21.70
Super Art ROM	£43.43
Database	£21.70
3D Zicon	£21.70
Utilities	£13.00

100k disc drive SS 40T	£40.00
Spark Jet printer	£75.00
3 way Centronics printer sharer	£45.00
RH Electronics Light Pen for BBC with software	£36.00
Torch Light Pen	£25.00
Plannercalc: Torch CPN format	£35.00
Masterplanner: Torch CPN format	£85.00
Silicon Office complete: For IBM	£209.00

5.25 inch discs are supplied in 10's with a free library case, or in 25's and 50's with a free sturdy storage box.									
5.25 inch	10	25	50	SONY 3.5 inch	10	50			
DS DD 96tpi	£12.50	£31.25	£62.50	DS	£39.00	£175.00			
SS DD 48tpi	£11.25	£27.50	£53.50						
AMSTRAD 3 inch	10	50	SONY 3.5 inch	10	50				
CF2	£37.50	£175.00	SS	£32.00	£150.00				

Please add 15% VAT	<b>NAME</b> .....
Payment by cheque to:	<b>Address</b> .....
<b>COMPUTACCOUNT (UK) LTD</b>	
Carriage: Items less than £50: £2.50.	
£50-£100: £4.50	
Carriage and insurance on items	
more than £100: £9.50	

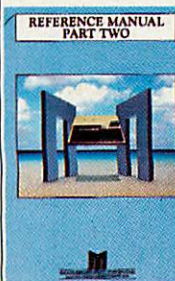
Quantity	Item	Price
.....	.....	£ .....
.....	.....	£ .....
.....	.....	£ .....
	Carriage	£ .....
	VAT 15%	£ .....
	<b>TOTAL</b>	£ .....



# REVIEWS

## B O O K S

### REFER TO THE MASTER



**'Master Reference Manual', Parts 1 & 2, £14.95 each**

After I unpacked my Master I carried on looking around the box thinking that there must be a proper manual in there somewhere. Now I've got not one but two fairly decent manuals.

The catch is that I had to fork out £15 for each of them.

Even so, they still don't cover two of the most important features of the Master, the *View* and *ViewSheet* programs built into the firmware. You're going to have to dip into your wallet to the tune of another £25 for that vital information.

It doesn't take a mathematical genius to work out that the real cost of a Master is not £500 but £555. It's true that some Master owners won't want the technical information in the reference manuals. Some may already have manuals for the firmware, having bought it for Bees they already own, and some may never use *ViewSheet*.

Beeb owners, however, are pretty serious about their machines and usually want to get the most out of them. Acorn has given us a sophisticated machine and then offered to tell us how to use it – at a price.

The catch is that, for some time at least, you won't be able to get the information held in the reference manuals anywhere else. There are important differences between the Master and the Beeb at all levels, from Basic down to the operating system. You can't simply get one of the plethora of detailed books about the Beeb and hope that the information holds good for the Master.

Perversely, the *Reference Manual Part Two* came out first. It is mainly concerned with Basic programming, with sections covering all aspects of BBC Basic – from keywords to error messages. In that respect it is reminiscent of the User Guide, but goes further, with detailed information on how Basic uses memory and the MOS.

The Basic keyword section is possibly the most heavily used part of the manual by beginners and even some advanced programmers. All the information is here, including syntax and examples. However, unlike the

User Guide, each keyword is not given a separate page. In addition the text fonts used don't really highlight each command, so finding the one you want is a slow business.

The assembler is covered in a similarly exhaustive way. Each keyword available with the 65C12 in the Master is described along with descriptions of flags affected and addressing modes available.

The other two sections of the Part Two manual cover the built-in Edit program and the terminal emulator. The former turns out to be very versatile indeed, with sophisticated formatting commands – something not even hinted at in the Welcome Guide.

As well as its use for editing Basic programs and other languages like Pascal, the edit program is a flexible wordprocessor. The manual does it justice, with clear descriptions of all the features.

The section on the Terminal program is less useful. The program is fairly crude. Although it can prove adequate for communicating with peripherals, like the Scorpion robot controller, anyone wanting to get into comms will need something else. The manual is pretty exhaustive though; it includes a great deal of detailed information on escape codes and sequences.

All that aside, it's the *Reference Manual Part One* that most people will have been dying to get their hands on (apart from the mythical *Advanced Reference Manual*).

Part One gives the lowdown on the MOS and filing systems, including details on all the OS calls. Osbyte, Osword and VDU commands are given a detailed treatment similar to that meted out to Basic keywords in the other volume.

A general chapter on the filing systems is followed by specific chapters on the cassette, ROM and disc systems in the Master. The latter covers both DFS and ADFS, and all chapters include a section on using the filing systems from assembly language.

The style is familiar from the old BBC User Guide, although this time Acorn has adopted a cumbersome page numbering system. It works well enough when you are simply looking for a general section. But finding a specific page mentioned in the index is slower than if ordinary page numbers had been used.

The manuals are about the size of the User Guide and they suffer from a similar binding problem. After about a week's ordinary use the pages start to work their way off the ring

binding, so the manual never closes properly after that.

Between them the two guides cover the same sort of ground that the User Guide and *Advanced User Guide* did with the Beeb. However, most of this information should have come free with the machine.

Steve Mansfield

### HEAD START FOR HACKERS

**'The New Hacker's Handbook', Hugo Cornwall, Century, £6.95**

Last year one slim paperback caused quite a stir in the computing fraternity. *The Hacker's Handbook* provided much-needed information to those micro users equipped with a modem who were wanting a little more excitement than the likes of Prestel and a few bulletin boards could offer.

The author defines 'hacking' as the recreational and educational sport of attempting to make unauthorised entry to computers and to explore what is there. The handbook will not dictate to you how to go about this. That cannot be done as it is an interactive process which changes from machine to machine and even day to day. Instead, the book will point you in a few worthwhile directions and suggest a few methods.

The handbook is a strange blend of the very basic and the quite advanced. In the first chapter, and in the appendices, the fundamentals of communications are covered – all those confusing baud rates, parity bits, duplex, PSS, protocols, and so on are spelt out in detail. In later chapters the secrets of viewdata and mainframe networks are discussed with an eye to invasion.

It's not just communication over the telephone that is covered. Methods of hacking by radio, and even hacking the telephone system itself, are revealed.

The whole subject of hacking has received some notoriety in the year since the first edition, with countless newspaper stories and films suggesting that hacking is an easy business requiring only a micro, a modem, and a book such as this. The truth is that you have to be long-dedicated to this essentially useless pursuit to succeed at all. If you are willing to so dedicate your machine, time, and patience, then this book will give you an invaluable head start.

Geoff Bains

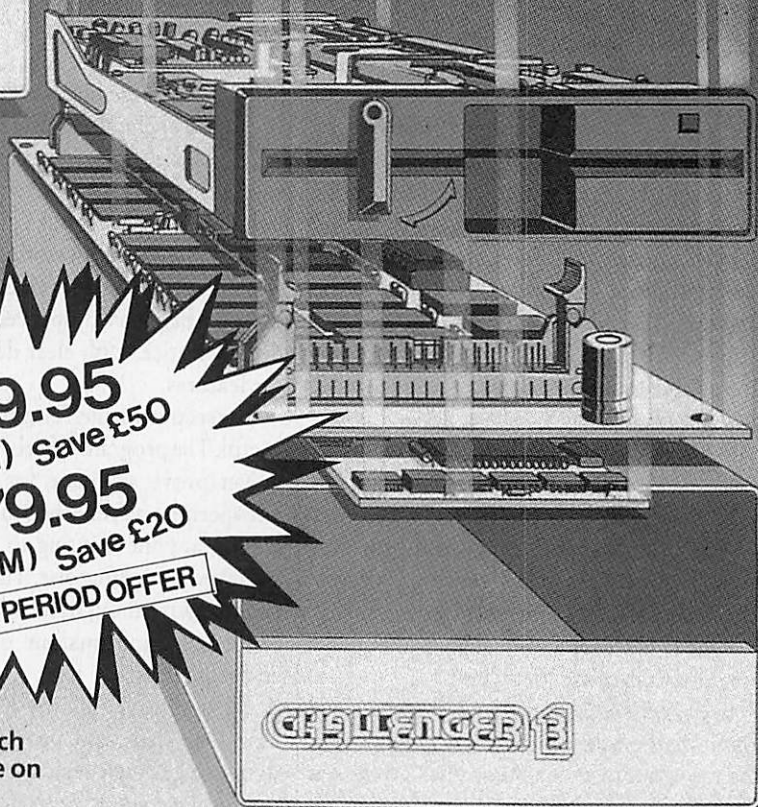


# IT MAY LOOK LIKE A SINGLE DISC DRIVE TO YOU...



## BUT YOUR COMPUTER KNOWS BETTER

**£199.95**  
(512K RAM) Save £50  
**£179.95**  
(256K RAM) Save £20  
**LIMITED PERIOD OFFER**



It's the clever bits only your BBC computer can see which help the Opus Challenger outperform every other disc drive on the market, including dual drive systems.

Only Challenger has both a conventional double-sided floppy disc drive and a high technology RAM disc, effectively a second, lightning fast solid state disc drive which turns your unit into a unique dual system with up to a massive 1.2 Megabytes of useable capacity.

Only Challenger has its own built-in double density disc interface, making all that soldering and track cutting associated with other interface connections, a thing of the past. Just plug-in and away you go.

You'll find more performance than from any dual disc drive system and from only £179.95, Challenger is up to £70 cheaper than even the most inexpensive twin drive and interface package. Unbeatable value and a unique 3-in-1 combination:

- **5 1/4" DOUBLE-SIDED 40/80 TRACK DISC DRIVE**
- **BUILT-IN DOUBLE DENSITY DISC INTERFACE**
- **INTEGRAL SOLID STATE RAM DISC** Up to 20 times faster than a disc drive and now available in 256K and 512K versions!

With all that power and performance you can race through work conventional disc drives labour over and, when you need to save to floppy, the RAM disc backs-up your information in a fraction of the time without any need for tiresome disc swapping. A & B Computing, which voted Challenger "Best buy of the year", said: "Using the RAM disc is a real dream... We checked a document just over 21K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc".

You don't even need to worry about compatibility. We've fitted the same disc controller chip used on the BBC B+ to make Challenger compatible with all leading software titles and it's suitable for use with the new 128 Master Series.

Challenger's price even includes VAT, FREE 72-hour delivery, the unbeatable Opus two-year warranty and a full operating manual.

So call us now on 0737 65080 for details of our nationwide dealer network or simply post the coupon. Generous education and dealer discounts available.

### CHALLENGER – SIMPLY LIGHT YEARS AHEAD OF THE OPPOSITION

To: Opus Supplies Limited, 55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.  
Please rush me the following: (PRICES INCLUDE VAT AND CARRIAGE)

Challenger Unit(s) £179.95 each including 256K RAM disc

Challenger Unit(s) £199.95 each including 512K RAM disc

I enclose a cheque for £ \_\_\_\_\_ or please debit my credit card  
account with the amount of £ \_\_\_\_\_

My Access ☐ Visa ☐ no. is:

NAME

ADDRESS

TELEPHONE

**Opus.**



# REVIEWS

## H A R D W A R E

# IMPROVE YOUR MEMORY

**The Multiform Z80 second processor is probably the most flexible currently available. Ed Brown explains why**

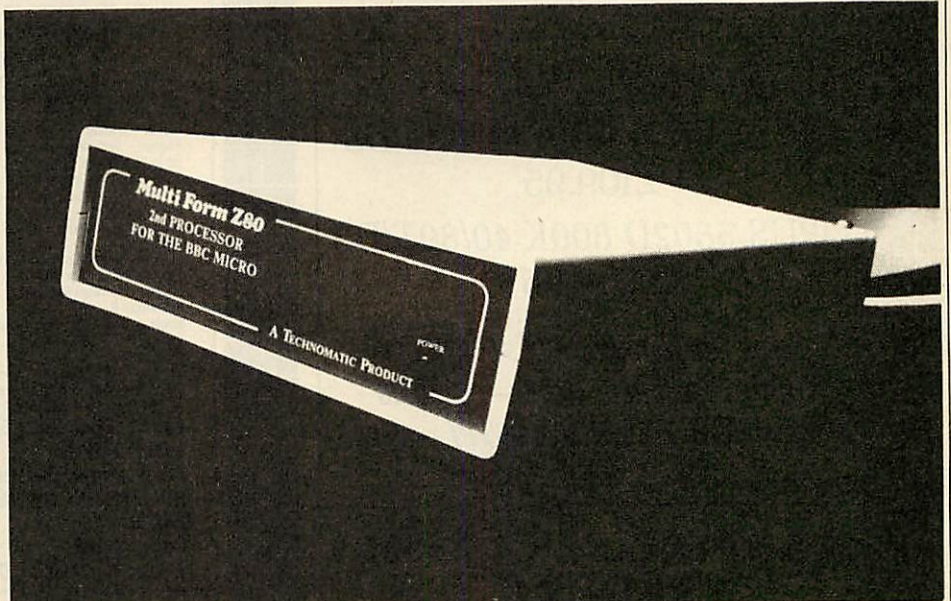
The latest addition to the Z80 second processor field is an offering from Technomatic aimed at those who have previously used CP/M. This Multiformat Z80 second processor overcomes the major criticisms of other Z80s by providing several disc formats that the user can select at will. In addition it is possible to add further formats as they are required, thus providing a very flexible and powerful system.

Until now it has been necessary to obtain software for Z80 second processors on their individual format of disc and then to install the software to handle the BBC micro screen control codes. Now by using the Multiformat Z80 these problems are a thing of the past. With a library of 28 formats (growing all the time) and three different screen emulations, together with the ability to read Torch format discs, the package is probably the most flexible currently available. Already an optional software package is being offered for reading and writing IBM PC format discs.

The package consists of a Z80 second processor and 64k of memory which is attached through the 1 MHz bus, a ROM chip, two discs and a manual. Its operating system is OSM, a CP/M look-alike, and as far as I can tell it is fully compatible with CP/M. When testing for compatibility I ran several programs ranging from the classics such as *Pocket Wordstar*, and the other Micropro products (kindly supplied by BEL), through to disc editing programs and communications software, and they all ran correctly. When ordering it is necessary to specify the type of filing system you are using, as the ROM chips for each system are different.

Full and clear instructions are given on inserting the ROM. The hardest task was removing the screws on the BBC micro casing. Once fitted, the \*HELP command shows the presence of the ROM and the system can be booted up by typing \*Z801 (the last digit determines the type of Disc Filing System that is fitted to the Beeb).

The system consists of the operating system, OSM, and the utilities PIP, STAT, SUBMIT, XSUB, ACCESS, BSTAR, SCOPY, DISPLAY, RS423, TORCHRW, and FORMAT. In addition there is the ROM-based



**Technomatic's Multiform Z80: aimed at previous users of CP/M**

multiformat software that comes into effect when the system is booted up with the \*Z801D command. On typing \*Z801D the system presents a menu of options on the screen which allows you to define the mode of operation of the system. Although this sounds complicated it is in fact simple. The seven options available from the main menu are described below with some short notes on what they accomplish.

Three terminal emulations are available on the system and these can be selected from this option on the menu. The emulations available are for the popular ADM3A and Hazletine 1500 and the BBC VDU in mode 3. This means that it is easy to install standard packages such as *Pocket Wordstar* for the Technomatic Z80 as these support either or both of these terminals. The option of BBC VDU mode 3 allows most programs to run that have been installed for the Acorn. The Display program under OSM allows the same selection of terminal emulations.

You can select which disc format you want for each drive by using the Read parameters option from library file option. This is done by first specifying which library you want to select from, and then by selecting a format from those presented on the menu. The package comes supplied with a number of formats,

including Acorn, Superbrain and Amstrad, in a file called General. Other formats and libraries can be created by using option 3.

The add/define parameters option allows you to define your own formats for discs you want to read or write but which are not already included in a library. The method of doing this is to answer a series of questions about the format you wish to read or write. To do this you will need to know details such as the number of tracks, the sectors per track, density, number of directory entries, number of skipped tracks and the skew factor. Most of this information can be obtained from STAT together with a little educated guesswork. The other option is to sit down and systematically work through the different combinations until you find the one that is right for the disc you are trying to access. But you cannot examine the formats already described to see if any match up to the format you want.

You can remove a format from a library by using the option, delete entry in library. First, specify the library and then select the format from the menu. Once selected you are asked to confirm that you wish to remove the library. Similarly, you can create a new library to add additional formats.

The format disc option allows formatting a disc in the format selected for the drive speci-





# MICROMAN Computers

**ACORN SPECIALIST COMPUTER CENTRE**   
All our prices include VAT.

## SUMMER SPECIALS

### MITSUBISHI DISC DRIVES

OPUS 5802 400K 40/80T/DS  
£109.95

OPUS 5802D 800K 40/80T/DS  
£259.95

Opus Challenger 256K — £189.00

Opus Challenger 512K — £215.00

Floppy Discs DS/DD/80T 96TPI — £9.95

### PANASONIC KX-P1080 PRINTER

This well-built printer offers many advanced features. It provides both friction and tractor feed NLQ as well as draft modes and full Epson code compatibility. This special offer includes a BBC Cable. Further details on request.

**£189.00**

### CAD SYSTEMS & PLOTTERS

BITSTIK II — £799.00

ROLAND DXY880A — £799.00

#### APPOINTED WATFORD DEALER



Microman has been appointed a Watford Dealer. We will be stocking a large range of Watford products, including the popular BEEB DIGITIZER, MAGAZINE MAKER, 32K SHADOW RAM CARD, and many more available from our shop.

We stock the largest range in the North of BBC Peripherals, Disc Drives, Monitors, Printers, Expansion Boards, ROM Software, CAD Systems and Plotters. Call into our shop or phone/write for our full price list.

#### MAIL ORDER SALES

 **PHONE**   
**074488 5295**

We accept both Access & Visa credit cards. Simply telephone your order, giving card number, expiry date, name and address, or send your order with cheque or postal order to FREEPOST MICROMAN at the address opposite.

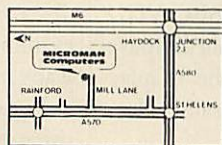
Carriage/Postage Charges: Computers/Printers/Disc Drives: Next day delivery, £8.00; Royal Mail Trackback, £4.00; ROMS/Exp. Boards/Software: First class post, £1.00.

Our Mail Order Dept. will despatch your order within 24 hours (subject to availability).

All our prices include VAT.  
Educational & Government orders accepted.

#### SHOP

Open 9-6 Monday to Saturday



Rainford Industrial Estate,  
Mill Lane, Rainford,  
St. Helens, Merseyside.  
Phone 074488 5242

## LOW COST C.A.D.

**ATTENTION ALL ELECTRONICS CIRCUIT DESIGNERS!!**  
"IBM PC (and compatibles), BBC MODEL B, B+ and MASTER, AMSTRAD CPC and SPECTRUM 48K"

ANALYSER I and II compute the A.C. FREQUENCY RESPONSE of linear (analogue) circuits. GAIN and PHASE, INPUT IMPEDANCE, OUTPUT IMPEDANCE, and GROUP DELAY (except Spectrum version) are calculated over any frequency range required. The programs are in use regularly for frequencies between 0.1Hz to 1.2GHz. The effects on performance of MODIFICATIONS to circuit and component values can be speedily evaluated. Circuits containing any combinations of RESISTORS, CAPACITORS, INDUCTORS, TRANSFORMERS, BIPOLAR AND FIELD EFFECT TRANSISTORS and OPERATIONAL AMPLIFIERS can be simulated — up to 60 nodes and 180 components (IBM version).

Ideal for the analysis of ACTIVE and PASSIVE FILTER CIRCUITS, AUDIO AMPLIFIERS, LOUDSPEAKER CROSS-OVER NETWORKS, WIDE-BAND AMPLIFIERS, TUNED R.F. AMPLIFIERS, AERIAL MATCHING NETWORKS, TV I.F. and CHROMA FILTER CIRCUITS, LINEAR INTEGRATED CIRCUITS etc. STABILITY CRITERIA and OSCILLATOR CIRCUITS can be evaluated by "breaking the loop". Tabular output on Analyser I. Full graphical output, increased circuit size and active component library facilities on Analyser II.

Check out your new designs in minutes rather than days.

"ANALYSER" can greatly reduce or even eliminate the need to breadboard new designs.

Used by INDUSTRIAL, GOVERNMENT and UNIVERSITY R&D DEPARTMENTS worldwide. IDEAL FOR TRAINING COURSES. VERY EASY TO USE. Prices from £20-£195.

### LOW COST COMPUTER DRAUGHTING ON THE BBC MODEL B, B+ and MASTER

DRAWER I enables quality drawings to be created, and modified, quickly, easily and with the minimum of hardware. All of the major program elements are written in machine code giving exceptional speed of operation.

#### FEATURES

Rubber Banding for drawing lines. Solid or Dotted line types. Circles, Arcs and partial or complete Ellipses. Vertical or Horizontal Text. Pan and Zoom. Merging of drawings and library symbols from disc. Up to 20,000 lines on a drawing.

Snap to a user defined grid.

Absolute or Relative cursor co-ordinates displayed on screen.

Input from analogue joystick, mouse or trackball.

Output to standard dot matrix printer or pen plotter.

Prices from £45 — ex VAT.

Minimum Hardware Required:

BBC Model B.

Single or Dual 5.25" Disc Drive — 40 or 80 track.

TV or monitor.

Games Joystick, Mouse or Trackball.

Dot Matrix Printer (Epson 80 series or Epson compatible — BBC default mode).

Full AFTER SALES SERVICE with TELEPHONE QUERY HOTLINE and FREE update service

For illustrated leaflets and ordering information please write or phone:

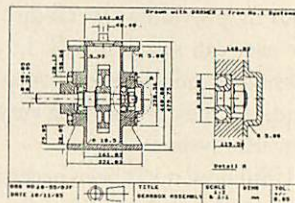
NUMBER ONE SYSTEMS LIMITED

TEL: 0480 61778

Ref: AU

TELEX: 323939

Crown Street,  
St Ives Huntingdon, Cambs PE17 4EB



NEW  
MICRO-MAILER

A LOW COST DISC BASED

## PROFESSIONAL ACCOUNTING PROGRAM

For The BBC Computer

### "Micro-Trader"

#### INTEGRATED SALES PURCHASE AND NOMINAL LEDGERS

Designed for business use by a business man. "Micro-Trader" Sales and Purchase Ledger Transactions are updated to the Nominal Ledger.

"Micro-Trader" offers full Sales and Purchase Ledger facilities including SALES INVOICE and STATEMENT PRINTING with a capacity of 450 accounts and 3000 transactions per month in each Ledger.

Normal Income, Expenditure, Assets, Liabilities & Journal Posting in the Nominal Ledger with full Reporting for individual accounts, Audit Trail, Trial Balance, Profit & Loss and Balance Sheet.

#### "MICRO-STOCK"

Stock Control program, fully integrated with "Micro-Trader". 4000 Stock Items with user defined Codes. Invoice and Credit Notes and Cash Sales routine. Full Stock Held Reports.

**£95.00 + V.A.T.**



NEW MASTER SERIES  
COMPATIBLE

#### NEW "MICRO-MAILER"

A Mailmerge program, fully integrated with "MICRO-TRADER" With a user Database.

**£45.00 + V.A.T.**

PHONE TODAY FOR A FREE FACT SHEET

## MEADOW COMPUTERS

11, LONDON STREET, WHITCHURCH, HAMPSHIRE, RG28 7LH

Telephone: Whitchurch (025682) 2008



# REVIEWS

## H A R D W A R E

fied. The same operation is carried out by the 'Format' program that runs under the OSM.

The Exit option allows you to boot the OSM operating system or enter any \* commands to configure the system before booting OSM. Once you have selected the disc format and terminal emulation you require then you exit the menu by using the Exit option. Now the disc formats to be displayed will be shown and if these are correct, the system is booted by typing Return. Once in the system the following commands are available: PIP, STAT, SUBMIT and XSUB are equivalent to their CP/M counterparts but provide a better idea of what is happening.

You can transfer programs between the BBC DFS and OSM using the 'Access' program. This provides an easy method of utilising the files previously created under the BBC micro DFS.

BSTAR allows \* commands to be accessed from OSM and is useful for setting up the function keys from within a Submit file for different programs.

The SCOPY program is provided to allow

for the copying of discs when only a single drive is available. Since OSM is provided in RAM it is possible to run the whole system with only a single drive.

The terminal emulations can be selection via the 'Display' program. The default emulation is the ADM3A emulation.

RS423 is a flexible program that allows the setting of all the necessary values for communications through the RS423 channel.

TORCHRW primarily provides for the reading and writing of Torch format discs but also gives format and examination facilities. All the facilities are easily accessible from the menu displayed when the program starts up. And there is a separate program to perform similar functions (including reading and writing) on PCDOS format discs.

Format allows the formatting of a disc in the format selected for the drive. Torch and PCDOS format discs are dealt with using separate programs. Format is similar to the format disc option on the start up menu.

Technomatic's Multiform Z80 second processor is a very useful package which allows

the use of many different disc formats, something that is normally only found on machines costing thousands of pounds. Although it does not use CP/M, the OSM operating system which is in ROM seems to be completely compatible with CP/M. A wide selection of programs were installed and tested without problems. The task of transferring and installing the programs for the system was greatly eased by the flexibility of the Multiform approach and the implementation of the terminal emulators.

In addition to the standard package there is an additional software package that allows the reading and writing of PCDOS format discs. This package works the TORCHWR software in that it is totally menu driven and provides the ability to read the directory of both OSM and PCDOS discs, delete files from OSM and PCDOS, and to transfer files in either direction.

*Multiform Z80 Second Processor, £299 and PCDOS Multiform Utility, £75, Technomatic Ltd, 17 Burnley Road, London NW10 1ED, Tel: 01-208 1177.*

## RAB Software RAB

STOCK CONTROL, INVOICING & DESPATCH

# S.I.D

£69 VAT  
r.r.p. £95

**No other program gives so much at this price**

### Stock Control

### DRIVEN FROM ONE MAIN MENU

- \* each stock record contains details of the following: name, current stock held, minimum stock, last qty received, last qty issued, supplier, price, date last issued, date last received, goods received note no., dateable, back order, cost of back order, minimum re-order qty, total sales, total purchases for period
- \* maximum of 500 stock records
- \* no need to swap files or save stock file for different functions
- \* comprehensive manual, user friendly
- \* options available to add, amend, list, inquire, print, update issues and update individual receipts
- \* summary of items below re-order level
- \* financial summary, giving sales/purchases for each item if desired
- \* 2 types of stock items: goods or sundries

### Invoicing

- \* order processing made simple through one easy routine
- \* orders can be entered, reviewed, changed, deleted and then processed
- \* 2 types of invoices created
  - summary only on invoice
  - each stock item ordered listed on invoice with prices and quantities
- \* statements produced
- \* all ordered stock items taken away from stock
- \* invoices/statements printed on plain paper with your name, address and vet number on top. Then the client name and delivery address followed by invoice details and then the foot message
- \* foot message can be modified
- \* auto increment of invoice number (also option available to set invoice number)
- \* items out of stock are marked as "back order" on invoice and not charged

### Despatch

- \* identifies goods/sundries to be despatched
- \* reference number printed on despatch note
- \* will identify back order goods

### MINIMUM HARDWARE REQUIREMENTS

◆ BBC B DFS., 80 trk DD DISK DRIVE, EPSON COMPATIBLE PRINTER, MONITOR

★ **Make Money** ★  
Use your Beeb to make you Profits  
Send for details

**DEALER ENQUIRIES**  
**WELCOME**  
Send for details

### ALL ORDERS BY POST ONLY

Your name, address, telephone number and vet number if applicable must be supplied as this is incorporated on your disk. (For invoicing part of programme and security).  
All Access orders must be signed with card number and expiry date and address of card holder supplied, cheque P/O made payable to "RAB SOFTWARE", for £79.35.

Send to **RAB Software 5 Maryfield Park, Mid Calder, W. Lothian EH54 0SD. Tel: 0506 882313**

AA241

## Does your BBC have a one track mind?

**True multi-tasking will put you out of your misery!**

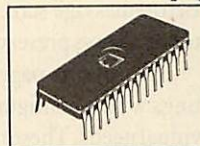
Your BBC now has the true multi-tasking potential of much bigger machines.

CMS Soft have cracked it!

This module, packaged as a ready-to-fit sideways ROM, brings you a robust system that holds its own in the most demanding industrial and laboratory conditions.

And there is no interference with normal BASIC functions; Multi-Basic enhances the power, speed and readability of the best BASIC Interpreter there is.

**£39<sup>95</sup>** incl. p+p



Real time Programs now possible on the BBC Micro.

- A serious tool - not an 'evaluation package'
- No extra hardware required
- No modifications needed to your BBC Micro
- Faster than procedure driven tasks

### So if you want:

- full MULTI-TASKING with up to 8 background tasks running concurrent with the main program
- BBC Basic CONTROL FEATURES powerfully enhanced
- the ability to run REAL TIME PROGRAMS
- control of PHYSICAL INPUT/OUTPUT
- 5 real-time COUNTER/TIMERS
- 8 real-time TASK INTERVAL TIMERS
- a COMPREHENSIVE MANUAL that describes each command in detail, with many practical examples

**MULTI-BASIC**  
is what you need



**MULTI BASIC**

CMS Soft Limited.  
Unit 18, Industrial Estate  
Chelmsford Road, Great Dunmow  
Essex CM6 1XG  
Telephone (0223) 324141

**CMS SOFT**



# REVIEWS

## S O F T W A R E

# AS SIMPLE AS ABC

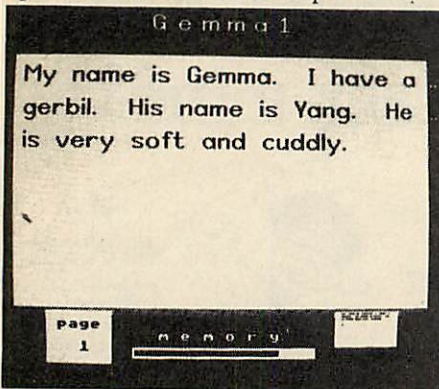
Chris Drage looks at wordprocessing packages for the younger user

A wordprocessor is a program that will allow text to be entered and edited and the results viewed on a monitor and printed on a printer. To date, wordprocessors for children have either been rather restrictive or overly complex. Finding the right balance has taken some time. The three second generation wordprocessing packages reviewed here break new ground in user friendliness and offer children a much better tool for writing.

### Folio

I don't think I have ever found a wordprocessor so completely child-centred as *Folio* from Tedimen Software. Controlled from its menu of six options, *Folio* deliberately provides a limited range of facilities. Only the essential elements are there, enabling even the youngest of writers to get to grips with computer writing quickly and confidently.

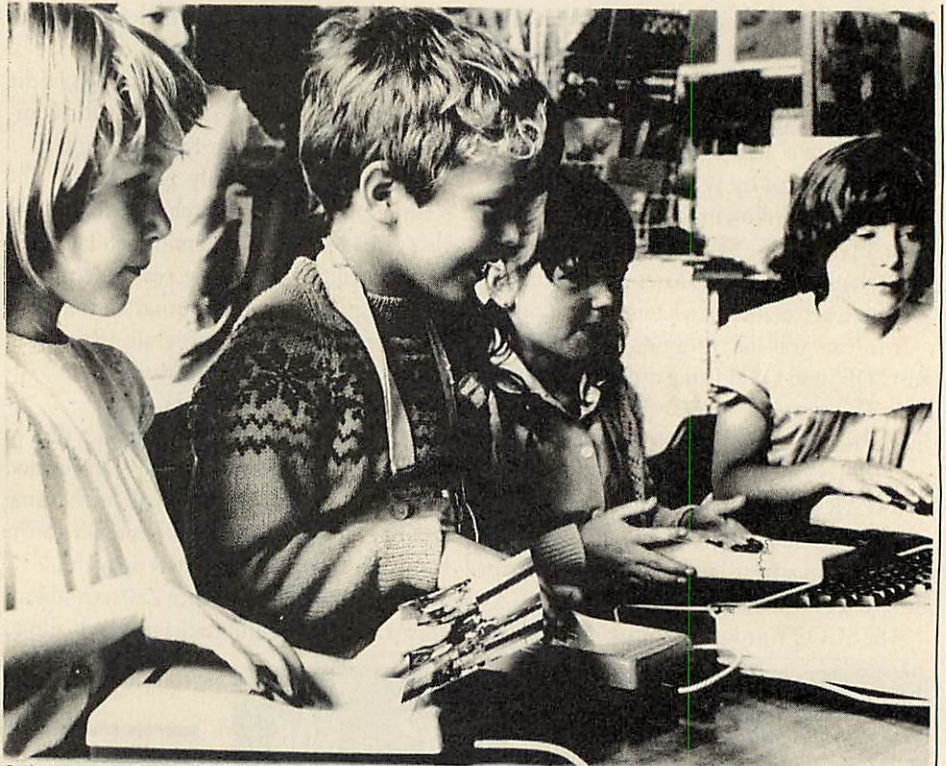
All set-up options are controlled from an options page which is completely transparent to the children. From the menu the Write option enters the editor where a pen nib cursor



Folio's clear and uncluttered screen

flashes, inviting input. The character set is completely redefined in the large, print-script familiar to infants. Large black text on a cyan screen guarantees clarity whatever the type of monitor.

The screen window comprises nine lines, of which the top and bottom lines always display half the text, reminding young children that their work has not totally disappeared. Document length is limited to about 1000 words maximum on a model B with Econet interface. This improves considerably with the B+ and Master 128. Other features of the writing screen are the memory meter which displays



Quinkeys can be used with these second generation wordprocessors

the amount of free memory available, the current page number and file name display and a page icon to show children the cursor's position in relation to the full page. Page breaks are represented by a black band. Seven function keys enable limited line operations to be performed. Lines may be joined, split, inserted and deleted. Combinations of Shift/CTRL and f1/f2 enable gross cursor movements to be performed.

Other menu options allow files to be saved, loaded and printed, the memory to be cleared for new work and *Folio* to be terminated. All operations may be reversed at a key press. The authors have taken great pains to ensure that *Folio* is well safety-netted and that every operation is logical, simple and can be undone. Error-message screens are easily read and the text is always preserved.

The options page provides a range of settings which configure the system to suit individual needs. These may be saved to the child's file thus preserving the settings for that child. The range of commands may be severely limited and introduced gradually as the child grows with the system. The current status of

the system may also be saved with the file, thus ensuring a child can pick up exactly where he/she left off. A welcome feature is the ability to use the Concept Keyboard to allow simple key input of words, phrases or commands. An overlay editor is provided on the systems disc. *Prompt2* overlay files can also be loaded into the *Folio* editor.

The print option allows for large, medium and small output. The attractive, on-screen text is reproduced authentically on paper; proportionally spaced for legibility.

Although originally intended for infants, *Folio* can certainly be used higher up the school. It offers children an outstanding start to wordprocessing.

### Pendown

*Pendown* from Logotron (of Logo fame), has been designed more as a writing environment for children than simply a wordprocessor. Its philosophy parallels that of *Folio*, being equally child-centred in its approach. As it is ROM/disc based it includes a wide range of facilities, some of which are provided on a utilities disc.

On typing \*PD the editor is immediately

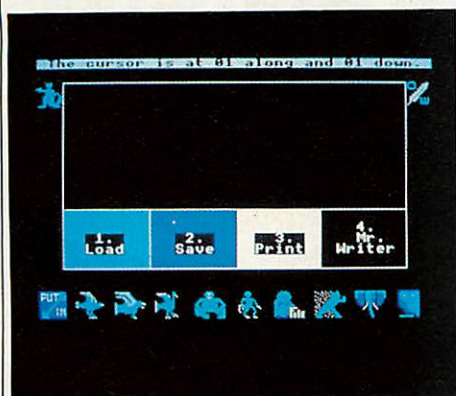


entered, avoiding a menu screen. A mode 7 screen of 40 columns is used, above which information relating to the cursor position, current line/page settings and bin status is displayed. A simple ruler is available beneath the information box. Text length is restricted to about 1200 words. Pressing f0 reveals the writing menu. Eleven settings relating to text revision, formatting, search/replace, Tab stop and Delete key use are available.

Each menu-box in *Pendown* overwrites the central part of the screen, the child's text still being visible around it. This reassures younger children that their text has not been lost. It is this thoughtful approach that so typifies the *Pendown* package.

Other function keys allow cut and copy, upper/lower case and a bins menu. The two bins provide temporary storage for text to be moved, copied or deleted, and each may hold approximately 350 words.

In addition to powerful text revision and formatting facilities *Pendown* offers a number of useful features also available from menus

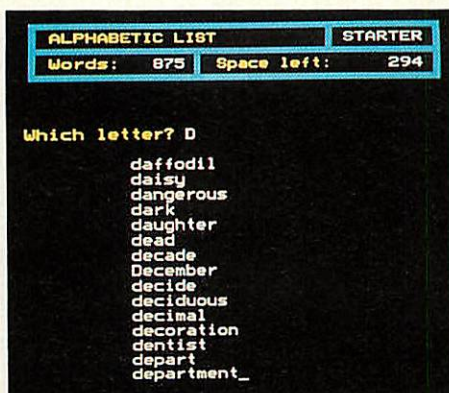


**Wordplay's fun animated menagerie**

accessed via the function key:

- on-line help with vocabulary and spelling
- on-line help screens to aid and give assistance to writers
- the ability to pre-plan the entire structure of the writing
- ability to use the Concept Keyboard or a similar device
- ability to print text using large typefaces

A dictionary is always available, providing children with over 800 correct spellings. This provides the child with a means of keeping a personal word bank, which can be searched



**Searching Pendown's dictionary**

alphabetically or by groups of words associated by theme or meaning. Lists may be altered, enlarged or reduced. The utilities disc provides a dictionary editor which takes the effort out of creating specific dictionaries. Similarly, help screens are always available to assist the writer.

Teachers may set up specific Help pages on any aspects they feel relevant to the needs of the children. The utilities disc provides a help page editor. Help files are so quickly and easily created that individual children could have their personal help pages available on their own work discs.

The Planner enables a tree-structured plan to be created which provides an outline for writing. Free movement is possible through the four branching levels (headings and sub-headings), of the plan.

The plan can be transferred to the *Pendown* editor and saved to disc for repeated use. Each of these facilities has an important effect on the writing process – they reduce the need to interrupt the flow of writing.

In mode 7 there are at least eight keys which don't display their key characters on screen. This may be reason enough for using the Concept Keyboard with *Pendown*. A separate program on the utilities disc provides a very comprehensive editor program.

Overlays may be created for the 128 key version of the Concept Keyboard. Being driven entirely by the function keys, the editor allows groups of keypads to be defined, altered and tested without any specialist knowledge. Each overlay is limited to 640 characters (or 128 four-letter words or four 159-letter words). After *Starset* this really is

the best Concept Keyboard editor I have used.

Other input devices like Quinkeys may be used with *Pendown* but the user must write his/her own interface utility.

*Pendown* was an immediate hit with my class of nine-year-olds because of the printer output. The range of fonts available make *Pendown* a truly versatile system. However, only Epson-compatible printers are catered for. The jumbo font is ideal for general primary school use. The ease with which large headings can be created for such things as wall displays



**Pendown: the utilities disc**

enthused the children. The chunky and horizon fonts were particularly popular. 80-column output is possible using the printer's normal font, but only teachers would require it. The utilities disc provides a powerful font editor. Small (40 column), medium (20 column) and large (10 column) fonts may be designed. Unfortunately, due to memory overheads only 31 large characters may be defined (eg, upper-case letters only). Up to 94 small/medium icons or characters may be defined (ASCII 33 to 126).

More able children were soon keen to design their own fonts. They derived enormous pleasure in seeing their work printed out in their own style of print.

Apart from its popularity with the children, I gauge the success of *Pendown* by the number of times I did not have to resort to the handbook for help. However, the 60-page manual explains the system's facilities simply and lucidly. *Pendown* represents a huge step forward in wordprocessing for children. It is a delight to use, providing a comprehensive range of facilities which are easily learnt and adapted by children.



# REVIEWS

## SOFTWARE

### Wordplay

Tape-based wordprocessors, by their very nature, are limited and cannot hope to compete with a ROM-based program. However, *Wordplay* from BBC Soft demonstrates what can be attained. To describe it as entertaining is an understatement. *Wordplay* comes complete with a detailed manual and program cassette. Disc users can transfer the program to disc via the Copier program.

The first screen that appears presents a number of cards which offer the facility to configure the printers, set the default filename, sound level and colours used. One card offers a spelling checker. Most of the default values are sensible and all that is necessary is to select the card for the editor.

*Wordplay* allows text to be input via the keyboard or the tape (disc) filing system. However, it is in the editing screen where *Wordplay*'s charm becomes apparent. The edit-screen is a nine-line page, each line being highlighted in blue. All text is clearly visible on

a television set. *Wordplay* has room for approximately 33 lines, after which the file must be saved and a new one started. A selection of animal icons appears beneath the text,



Designing characters with Pendown

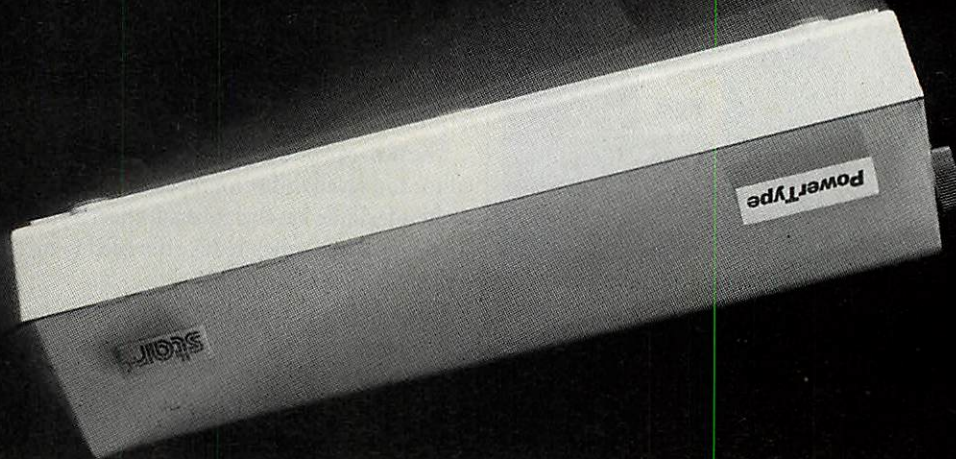
each of which is activated via the function keys. Each animal performs a particular task; Selina Seagull removes words, while Eve the Elephant right-justifies the text. Between them, most basic wordprocessor functions

can be obtained. The manner in which each creature performs its task is delightful. Marcus Mouse scurries up the side of the screen, picks on the chosen letter, runs with it to the end of the line and drops it into Bardolf the Bin, who opens his lid to receive it. Naturally, children are entertained by the animated antics of this delightful menagerie.

If all editing is complete, the text may be saved and printed using Petronius Pelican. Files are saved under one default filename which can be altered via the initial cards or the spelling checker. The program may be configured to both parallel and serial dot-matrix printers. The spelling checker is a welcome feature of *Wordplay*, and up to 400 words may be stored. Unrecognised words in the text may be marked, altered and added to the dictionary. From disc the checker is quick and simple to use.

The program works well and does all it purports to do. All operations which are fairly drastic in consequence are trapped, minimis-

# We're standing printer



## PowerType DAISYWHEEL PRINTER £229

With over 100 type fonts on widely available daisywheels and using standard ribbon cassettes, PowerType is remarkably cost efficient. A wide carriage giving up to 165 columns of beautiful print in the typeface of your choice, even a graphics capability, the flexibility of reverse paper feed and 18 characters per second means swift, classic correspondence. PowerType comes with Parallel and Serial interfaces as standard.

A&B Computing said in July that Powertype was a quality printer with a host of standard features, excellent value at £400 – How would they rate it now?!

## STX-80 THERMAL PRINTER £79

This quiet and efficient machine prints at 60 characters per second and the compact thermal printhead, designed for dependable performance, will give you a lifetime service of 20 million characters.



ing accidental loss of text. Unfortunately, the author has not trapped the Break key although the manual suggests how a Break key guard can be constructed.

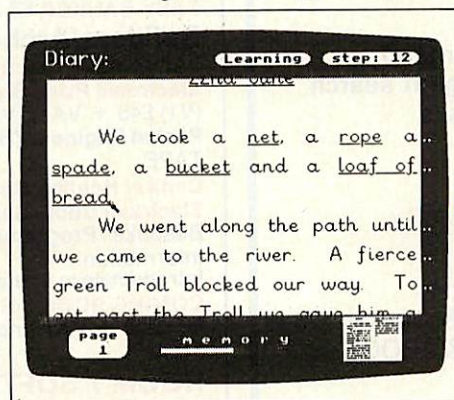
The standard of the documentation included is very good. Every facility is covered in a section of its own.

At school I worked through the program with nine-year-olds who experienced few problems writing a story. These children, familiar with wordprocessing, became rather bored with animated operations as the novelty wore off.

The limitations of 33 lines per file, the rather laborious approach and the single print output exclude serious classroom applications. However, *Wordplay*'s novelty and simplicity make it ideal for home use; a delightful introduction to wordprocessing. Home users requiring educational software for their Electron or Beeb will find *Wordplay* a worthwhile investment.

A progression in levels of wordprocessing

seems essential if real development is to take place in schools. These should range from a text editor suitable for quite young children with limited sight vocabulary, through to a



#### Children's stories on Folio

simple wordprocessor that allows unconstrained manipulation of text, to sophisticated systems with a wide range of facilities including spelling, checking and planning options.

*Folio* provides an excellent introduction to

the process. Its large text and simplicity of use combined with its excellent child-centred design, result in a system that is ideal for infant/lower junior use.

For older children *Pendown* is an outstanding system, probably encompassing everything that a primary school requires in a word-processor. At £34 it represents excellent value for money.

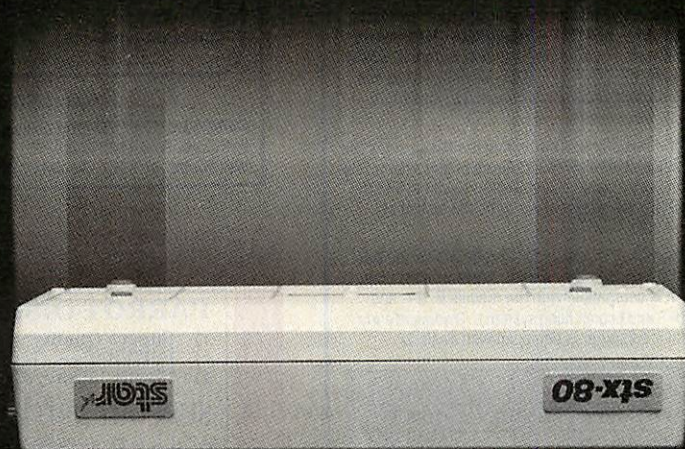
*Wordplay* is fun and is a must for home use. Electron users should regard this program as a definitive start to the whole family's word-processing.

'*Folio*', £15, is available from Tedimen Software, PO Box 23, Southampton SO9 7BD. Tel: (0703) 473774. Runs on BBC B, B+ and Master 128. Education authority licences available.

'*Pendown*', £39 from Logotron, Ryman House, 59 Markham Street, London SW3 4NO. Tel: 01-352 1088. BBC B and B+.

'*Wordplay*', £11.95 by BBCSoft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-927 4518. BBC B, B+, Electron (cassette).

# prices on their heads.



The STX-80 has a carriage width of 80 columns, graphics and many of the features of much larger printers. It's so quiet, the only thing that will make you shout is the price!

PowerType and STX are part of a range of exceptional quality printers - With prices this good you'll go head over heels for a STAR!

Ring - 0272 217777  
for more information  
(24 hour manned switchboard).

**star**

For more information and the address of your local dealer complete the coupon and send it to Star Micronics U.K. Ltd. Craven House, 40 Uxbridge Road, London W5 2BS.

Name

Address



# folio

a word processor with powerful facilities easily tailored to suit any age range.

- \* **UNDO** recovers after any command
- \* **LEAP** a progressively convergent search
- \* **LEARN** simplifies repetitive tasks

- \* **5 proportionally-spaced fonts**
- \* **Microjustification & underlining**
- \* **Printing in 3 sizes**

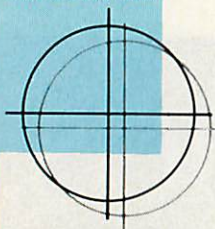
Requires an Epson-compatible printer.  
Compatible with BBC Model B, B+ & Master 128;  
DFS, ADFS & NFS (where PAGE ≤ 1800).

£17.25 inc. VAT & UK p&p

**TEDIMEN**  
SOFTWARE

P.O. Box 23  
Southampton  
SO9 7BD  
Tel: (0703) 473774

## CROSSWARE



SOFTWARE  
DEVELOPMENT TOOLS FOR  
THE BBC MICROCOMPUTER

## CROSS · ASSEMBLERS

FULLY SUPPORTED  
QUALITY SOFTWARE

### Assemblers and Disassemblers on ROM

The BBC Microcomputer is an impressive machine, especially the new Master 128 running with the hierarchical Advanced Disc Filing System. Our software allows full use of its advanced facilities. For example, source code modules held in separate files of any name in any directory on any drive can be linked and assembled to create your machine code program in Motorola S, Intel hex or binary format.

It's also very fast. In fact, one of our customers has compared the speed of the BBC micro with Hewlett-Packard's powerful HP64000 development system. He assembled identical software on both machines and was surprised to find the BBC micro running with our 6801XR cross-assembler to be the fastest of the two.

Our software is available for assembling machine code programs for the BBC micro itself (for which our 65C02XR rom is ideally suited) or for any of the other target processors listed below. It is compatible with the models B, B+ and Master 128 and with all DFS, ADFS and Econet filing systems. (Owners of early model B's should ensure that their computer is equipped with Basic 2).

Order Code	Target Processors	Price
6801XR	6800,6801,6802,6301...6301X	£48.00
6805XR	6805,146805,6305	£48.00
6809XR	6809 family	£48.00
8085XR	8085,8080A	£48.00
Z80XR	Z80, HD64180	£48.00
68000XR	68000,68008	£56.00
65C02XR	65C02, 65SC02, 6502	£38.00

Further information from:  
**CROSSWARE PRODUCTS**  
2 The Lawns, Melbourn, Royston, Herts SG8 6BA  
Telephone: 0763 61539

(prices exclude VAT)



## POOLS CHEQUE DON'T MISS YOUR WINNINGS A LITTLE GEM



Ideal for any pools entrants, syndicates or Litplan users. As many copies of printout as required. Stores your lines or perms, once results are known enter results and the computer automatically prints out your highest score. BBC B & MASTER (DISC).

**ONLY £12.50**  
INC VAT

Also available

**EASY BANKER** £8.50 as previously advertised.

**Builders/Architects/Surveyors/Educational**

**"All-in-rate" Calculator** £15 + VAT.

**Electronic Price Book**

(V1) £45 + VAT, (V2) Extended £95 + VAT.

**Pocket Engineer** (Beam stress calculator) £30 + VAT. Disc or TAPE.

**Central Heating Calculator** £45 + VAT.

**Electrical Cable Selector** £45 + VAT.

Bespoke Programming/Conversion work - Write/Ring for information.

**Introduction to Statistics** - £9.95 inc VAT

**COMING SOON - ESTIMATOR** £125 + VAT.

Or £200 + VAT (including Price book version 2).

From

### ROOM 7 SOFTWARE

Discounts available on multiple orders.

All prices inclusive of postage & packing.

Trade discounts negotiable.

All programs run on BBC B & Master



Letters/cheques to: **W.L. Computer Services, Dept 2, First Floor, H.S.L. Buildings, 437 Warrington Road, Rainhill L35 4LL**  
Orders using **Barclaycard/Visa** tel: 051 426 9660

AA282

VISA

## 3" HITACHI DISK DRIVES

Suitable for use on the Amstrad 6128, 664, Tatung Einstein, BBC with DFS. 40 track, double density. 3 ms track access time. Unformatted capacity - single sided 250k; double sided 500k. Shuggart interface. Plug compatible with 5 1/4 inch drives.

PRICE:  
£29.95 + VAT  
Single sided  
£39.95 + VAT  
Double sided



Cables available for connection to:  
Amstrad - £7.50 plus VAT.  
BBC - £10.00 plus VAT.  
Tatung - £10.00 plus VAT.

FOR FURTHER DETAILS SEND S.A.E. TO:

**MATMOS Ltd.**, Unit 11, Lindfield Enterprise  
Park, Lewes Road, LINDFIELD,  
West Sussex. RH16 2LX. Tel. 0444-73830

Or **Computer Appreciation**,  
111 Northgate, CANTERBURY, Kent. CT1 1BH.

## TYPEWRITER & PRINTER RIBBONS \* PRINTWHEELS

### PARROT DISKETTES . BRITISH MADE

- 1) Superb Quality
- 2) Full Lifetime Guarantee
- 3) Plastic Library Case (SEE 10)



### SUPPORT BRITISH INDUSTRY & EMPLOYMENT

5 1/4" S.S.S.D. @ £0.70 Each  
5 1/4" S.S.D.D. @ £0.74 Each  
5 1/4" D.S.D.D. @ £0.92 Each  
5 1/4" S.S.Q.D. @ £1.03 Each  
5 1/4" D.S.Q.D. @ £1.09 Each

3 1/2" S.S.Q.D. @ £1.88 Each

3 1/2" D.S.Q.D. @ £2.38 Each

Call Paul Lampard - National Sales Manager

**BRITANNIA**  
COMPUTER SUPPLIES

3 Parklands Parade, Bath Road, Hounslow, Middlesex. Tel: 01-570 2529

IBM-BRANDED PRODUCTS \* LISTING PAPER \* DATA CASSETTES

CLEANING PRODUCTS \* STORAGE BOWLS



# EDUCATION

## NEWS

### North by north west

Soft-Teach Educational is a new company which has grown out of a service company to another publisher. Anna Bartholomew and Tony Ramsay have developed a variety of packages for Longman and have now decided to go it alone with their first offering, *General Map Reading*.

This package involves a high degree of pupil involvement, it generates problems in relation to a whole range of map-reading skills and then monitors the pupils' solution of the problem. This interactive method is not only effective in keeping the child's attention but also provides feedback to enhance learning.

The package is very simple and friendly to use, involving only the movement of the cursor and pressing Return. It is a useful package for the home and classroom as its instructional method is inbuilt. It may be used for group work or classroom demonstration, and further development is possible using the worksheets and colour map provided. The package costs £20 plus VAT or £40 plus VAT for a network version.

Contact Soft-Teach Educational, Sturgess Farmhouse, Longbridge Deverill, Warminster, BA12 7EA.

## MESU questions asked

by Nick Evans

Since the disappearance of Microelectronics Education Programme (MEP) and the subsequent setting up of Microelectronics Education Support Unit (MESU) there has been a hiatus in educational computing circles.

The dissolution of MEP came as something of a surprise to many. Others looked at the expense and the inefficiency of innovative work and decided it was time to call a halt.

Even at this stage the less sceptical were prepared to believe that the end result would be a drastic pruning of resources.

In the end the whole structure was disbanded. Surprisingly, despite an acknowledged need to provide continuity there was no concrete move to set up MESU until just prior to MEP's demise. Consequently the appointment of the board, the new director and the hierarchy was spread over a long period. John Foster – the director of MESU – only took up his post in August and at the time of writing is isolated in a large hi-tech building with no staff. Worse still, there is little likelihood of appointees taking up posts until January 1987.

A hole has been left which has



John Foster: the new director of MESU

caused problems in terms of training teachers for Government schemes, providing information and general pioneering as technology moves forward.

People's fears are outlined in the following questions. The blame for the problems does not lie anywhere specific – certainly not at John Foster's door, although he is the one who has to fend off the criticisms. In next month's *Acorn User* an interview with John Foster will bring out his feelings about the issues.

● Can MESU keep in contact with the grass roots out of which the people and projects of MEP grew, when operating from a single base?

● How will MESU deal with the frustration felt by those who are having to hold responsibility for training together until MESU comes on stream?

● Will MESU discard the momentum generated under MEP and can that momentum truly be sustained through the LEA centres?

● What will MESU do that is directly relevant to teachers in the classroom?

● How will MESU help teachers to bridge the widening chasm between developing technology and the classroom teacher, bearing in mind the small number of staff available for such work?

● Although people realise that MESU is not an MEP clone, how will the MESU work to its new brief without causing alienation?

The answers to these and other questions are likely to determine the success or otherwise of the fledgling MESU in the eyes of schools.

### EDUCATION TOP FIVE

Title	Publisher	Cassette	Disc	Machines*	Econet
1 Speech!	Superior	£9.95	£11.95	B	Yes
2 Music System	System	£13.00	£26.04	B/B+/M	Yes
3 Happy Letters	Bourne	£8.95	£10.95	B/B+/M/E	Yes
4 Fleet St Editor	Mirrorsoft	—	£39.95	B/B+/M	—
5 Happy Writing	Bourne	£8.95	£10.95	B/B+/E/M	Yes

Compiled by Gallup/MicroScope. Publishers: Superior Software, Regent House, Skinner Lane, Leeds 7, Tel: (0532) 459453; System, 12 Collegiate Crescent, Sheffield S10 2BA; Bourne Education Software, Bourne House, The Hundred, Romsey, Hants, SO5 8BY, Tel: (0794) 523301; Mirrorsoft, Maxwell House, 74 Worship Street, London EC2A 2EN, Tel: 01-377 4644 \*Machines include the following: B (BBC); B+ (BBC Plus); M (Master); E (Electron)

**Commentary**  
by Nick Evans



# Announcing a Great New Deal for all Primary and Secondary Schools

## INTRODUCING

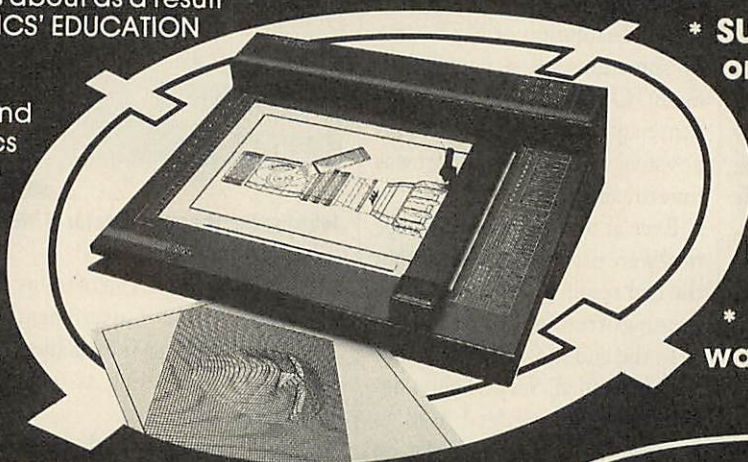
### SUBSTANTIAL REDUCTIONS ON ALL PLOTTERS

Plotmate is recognised by many educationalists as one of the most sophisticated and practical plotters available at its price.

Now Primary and Secondary schools throughout the UK can reap the many benefits obtained by using PLOTMATE as an aid to computer based teaching at a cost which is lower than ever before.

This tremendous offer comes about as a result of the unique LINEAR GRAPHICS' EDUCATION SUPPORT SCHEME (ESS).

ESS has been devised and launched by Linear Graphics in order to provide the educational environment with the best possible value for money when purchasing this highly versatile extension to their computer graphics systems.



### COMPARE THESE PRICES!

<b>PLOTMATE A4</b>	<b>£224</b> a saving of <b>25%</b>
<b>PLOTMATE A4M</b>	<b>£299</b> a saving of <b>25%</b>
<b>PLOTMATE A3</b> (with free Cadlink Disk and Plotmate ROM)	<b>£299</b> a saving of <b>30%</b>
<b>PLOTMATE A3M</b>	<b>£426</b> a saving of <b>25%</b>
<b>SCANNER</b>	<b>£120</b> a saving of <b>20%</b>
<b>UPGRADE KIT A3 TO A3M</b>	<b>£150</b>

**PLUS save 20%-25% on all plotting accessories.**

All prices are ex VAT.

# PLOTMATE

## LINEAR GRAPHICS LTD

28 Purdeys Way Rochford Essex SS4 1NE  
Tel 0702 541663/4/5 Telex 995701

### LINEAR GRAPHICS EDUCATIONAL SUPPORT SCHEME

Under the ESS the following features become available:

- \* **SAVINGS of up to 30% on normal prices.**
- \* **FREE training available.**
- \* **SUBSTANTIAL discounts on all Linear Graphics Software packages.**
- \* **FULL support and service from the manufacturer.**
- \* **TWELVE months warranty.**



PLOTMATE Graphics Plotters are British manufactured products and approved by ILEA.

Please rush me information on Linear Graphics' Educational Support Scheme. I am particularly interested in (please indicate).

NAME \_\_\_\_\_

POSITION \_\_\_\_\_

SCHOOL/AUTHORITY \_\_\_\_\_

ADDRESS \_\_\_\_\_

TELEPHONE \_\_\_\_\_



### HS Software adds hardware

HS Software, formerly called Highlight Software, which was featured in May's Education News, has added hardware to its list of talents. Its 'Shapeway System' is an analogue interface box which allows the connection of heat probe, light sensor and other devices. It comes at a time when schools, particularly in the primary sector, need low-cost control and sensing devices. It costs £34.95 inc. VAT and p&p for the interface box, two probes and crocodile clip connectors as well as software and manual.

The user may make sample readings from the sensors at intervals of anything from 1/100th of a second to 100 seconds. The length of time of sampling may also be varied from a few seconds up to several days. The results may be plotted on to a graph which is dumped to a printer.

The system will also take variable voltage readings up to a maximum of 1.8v. I am assured by the manufacturers that if this is accidentally exceeded then a safety fuse will be burnt out, thereby protecting the circuitry of the micro. The same 'development' socket will also measure variable resistance and so variable potentiometers may be connected, interfaced for example to a pendulum or a moveable arm, in order to take readings to illustrate the position of the device at any given moment in time.

Contact HS Software at: 56 Hendrefoilan Avenue, Skeppy, Swansea SA2 7NB.

### Logotron move

Logotron, the producer of Pen-down and Logotron Logo, has moved to Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.

# Adventurous learning

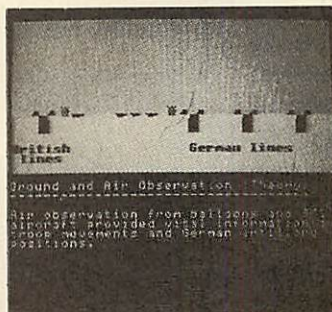
Comprehensive resource packs are a boon in the classroom at all ranges. If the teacher is given worksheets, project outlines, maps and other associated material, then the task of making that project work in the classroom is all the easier.

Tressell Publications produces packs which rival for volume of material even Cambridgeshire Software House's *Cars - Maths in Motion* pack.

Tressell's *Attack on the Somme* package (£16.99) is the smallest. It comprises a disc, two historical study books from its *Active Learning in the Humanities* series, a teacher's book and five copies of the pupil's workbook.

The package provides a medium for studying the nature of trench warfare, the lives of the soldiers and the decision-making which led to the disastrous loss of life in the Somme campaign. The unusual thing about this and the other packs is that they aim at the upper junior through to secondary GCSE standard.

Tressell's *Wagons West* package (£29.95) is a good deal more hefty.



Attack on the Somme from Tressell

As well as two discs there are four sets of nine information sheets, two posters, eight group cards, various sets of record sheets and a teacher's guide. The package aims to simulate the planning and hardships undertaken by settlers travelling to the Wild West.

*Into the Unknown* (£27) is a similar style of pack but aiming at the 15th-century explorer. Again, the software is a focus for a broad-based general study of many of the aspects of life in that time.

The educational thought behind these packages is based on very sound principles. The computer is not the centre of operations. It is a focus and a means to stimulate the work which the

children are undertaking. For that reason, the support material which accompanies the packs encourage the user to work away from the computer. Moreover, they encourage an approach to history which is not based on cramming facts but on simulating and understanding the circumstances which led to events happening and a critical approach to evidence as it is presented.

Tressell is a teachers' co-operative which manages to produce high-quality materials at a low price. Commercial education software publishers, if they consider such complex packs, would charge up to three or four times the price for them. This material is excellent value for money. The support material is not dependent on the software and therefore may be used separately and, indeed is part of the comprehensive range of teaching material other than software which this company produces.

Tressell Publications, Lower Ground Floor, 70 Grand Parade, Brighton BN2 2JA Tel: (0273) 600186.

## Hope for the future of MEP centres

John Foster, head of the MESU, has called a meeting later this term to pull together the fragmented MEP regional centres.

Education authorities have stepped in to fund several centres, although some are in a precarious situation. Others have been difficult to contact, so we would welcome hearing from them.

Those which seem to have disappeared are: Eastern Region at Chelmer Institute of Higher Education; Greater Manchester and Lancashire at Manchester Poly; East Midlands at Loughborough University; West and

North Yorkshire at Leeds Poly.

Others are hanging on by a thread. Capital Region consortium fell through and, at the time of writing, no rescue plan was envisaged. Capital Media, the software publishing arm, is soldiering on in the person of Liz Williams. Merseyside with Cheshire, at Liverpool Poly, is continuing to fulfil an information and in-service training role, as is South West region, now based at Brunel Technical College, Bristol.

The Welsh unit continues with training and publishing, and Northern Region at Newcastle

has reformed into Northern Region Information Consortium Centre (NORICC), which will continue its publishing and information provision.

Chiltern's Advisory Unit (AUCBE) continues largely unchanged. South Yorks and Humberside will continue its RESOURCE venture.

West Midlands will continue at Shrewsbury, and Northern Ireland under NICED. Southern is split into SMIC east and west at Brighton and Southampton.

SEMERCs will continue with MESU funding for three years.



# EDUCATION

# HOME FROM SCHOOL

How computers in the home can be used  
to augment the learning process

**Chris Drage and Nick Evans**

Many people, in the first flush of enthusiasm for computers, justified their purchase by saying 'it's educational!'. Reluctant spouses, seeing immediate advantages for their children, were convinced. However, it soon became apparent that home education software was not always what it was cracked up to be. This article aims to explore ways in which computers might help to bridge the home/school divide. It will also suggest software packages that might help this process.

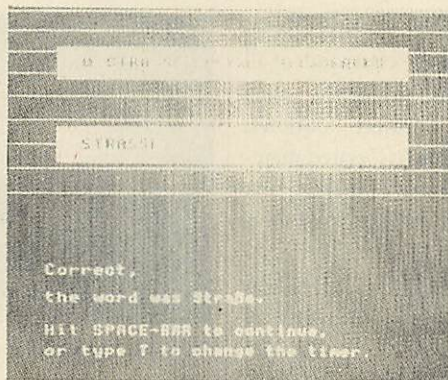
Although many homes have a personal computer, a large proportion do not and of those who do, not all possess the same make of equipment. Continuity from school to home can be, therefore, a difficult task. You must, however, make the best use of your equipment, and select software which is relevant to your child's needs and which will perform its function effectively.

What are the needs of your child? Children are not noted for communicating information about what went on at school, and teachers are even less inclined in many cases. And what is the 'function' of the software? If you're not a teacher, the educational validity of a package is not necessarily apparent – this is borne out by the inordinate numbers of drill and practice 'interrogation' packages which are sold under the banner of education. The availability of software is a further problem. Although you may know the title of a package used in school, many companies have no direct retail outlet to the home, as most educational software houses do not market in the High Street.

Solutions to these issues are not particularly easy to find so we will tackle them in two parts – types of software and educational needs.

## Software styles

Drill and practice programs will perform a presentation on screen – a set of information or list of facts – and there will then follow a test on the content of the information. Although this process may be dressed up in a fancy costume, this type of program repeats the facts, and presents the questions and drills you until you get it all right. The kinder variety allows you to get it all wrong and then tells you what a failure you are by presenting you with an abysmal score! Some educationalists find the 'sledgehammer' technique effective in



## Getting to grips with languages

cramming for examinations – I do not! Almost invariably information learnt in this fashion does not form any useful part of the structure of understanding of the subject. Apart from its advantages in learning long lists of, for example, vocabulary in modern languages, the validity of this type of material is dubious and most reputable educational software houses will have nothing to do with it.

## Revision programs

At this point it would be useful to make the distinction between revision programs and teaching programs. If you want your child to revise something that they have already learned then the 'programmed learning' type of software may be useful. BBC Soft has become a master exponent of this type of presentation. The 'Computer Synchronised Audio' science programs allow the child to take an audio-visual tutorial in a range of subjects. The user's understanding of the topic in hand is tested at regular intervals. This is achieved through questioning but more often by performing a task which incorporates understanding the principles involved. The feedback from the program ensures, in a friendly fashion, that the children understand the topic before moving on. Many schools use BBC programs and they have gained a reputation for quality. The programs may be classified as 'revision' and 'teaching' types since it would be possible for a child of appropriate age to start with one from first principles.

A further program which is a fine example of its type is the 'learning by simulation' package. For example, *Introducing Geography* is a pack which takes a sideways look at the princi-

ples of geography. As the child follows the contours in *River*, in order to find the river which is the only route to the sea and survival, he or she learns the principles of contouring without this being explicitly explained. They learn by discovery. Similarly with other items in this pack, *Nomad* involves the reading of weather conditions in order to ensure a herd of cattle survives; *Flight* is a program which demands an understanding of navigation and *Summit* will test planning skills in an assault on Everest. It has also linked its modern language courses on television, *Deutsch Direkt* and *A Vous La France*, to computer programs.

This excellent software house has produced many educational programs of high quality and good value for money. Other companies have been less adventurous but just as enterprising, eg, Letts Revision Packs – its Key Facts cards – have been around for a long time. The little crib sheets which exam candidates finger in their pockets are now on tape and disc. Their structure has been changed to take advantage of the medium and as a revision method they are quite useful. Other companies performing the same type of service are Akadimias (English literature and history), John Wiley (technical and sciences), Medstat (modern languages) and AVP Computing which produces an interesting range of materials covering a broad band of topics.

Chalksoft has also been at the fore-front of this market with its ever-increasing range which includes the economic simulation *Yes Chancellor*, *Forensic* – a scientific research simulation and *Centre Ville* a modern language discovery program.

A list of publishers could go on and on: ESM, Acornsoft, ASK (now available only through ESM), Mirrorsoft, System, 4mation and many others, all of whom will complain they did not get a mention!

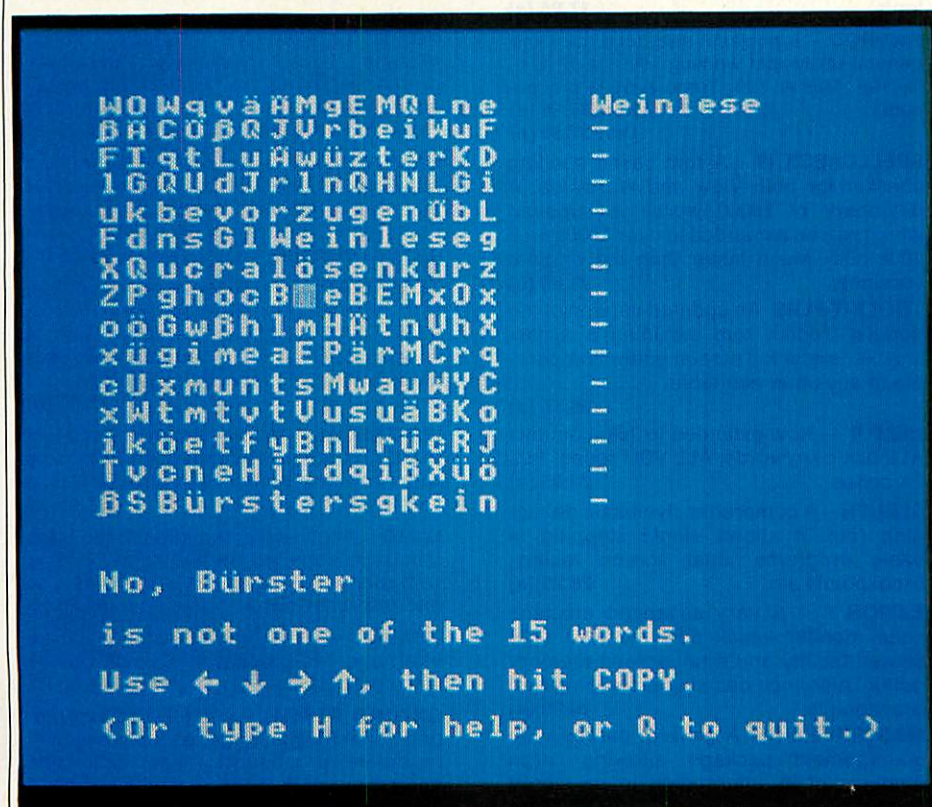
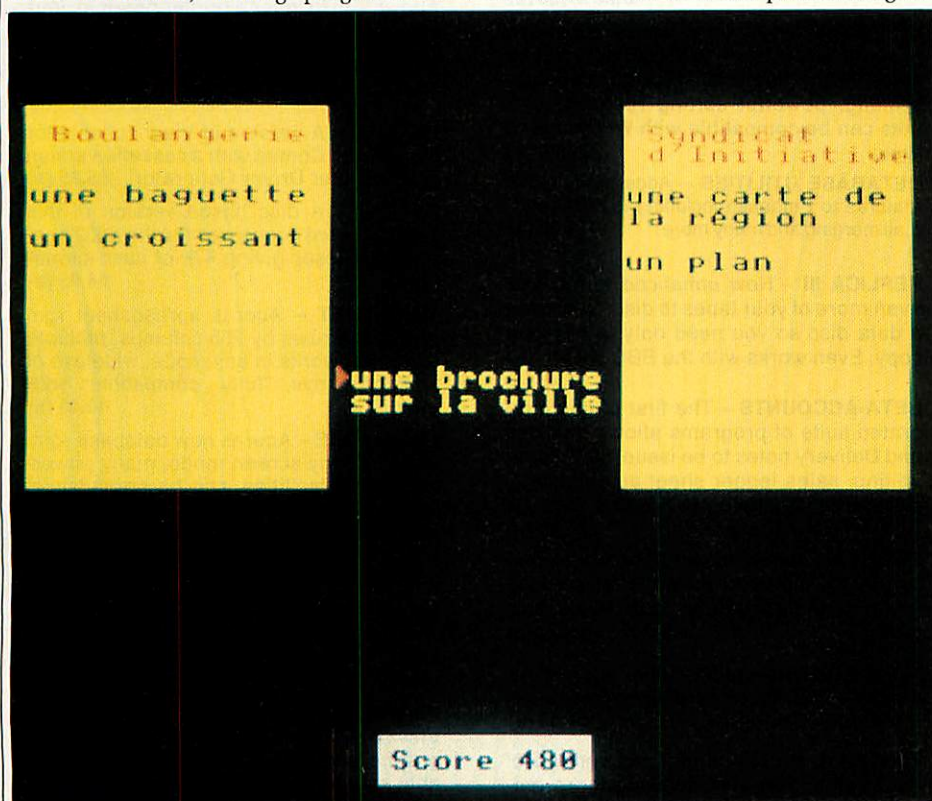
## Teaching programs

As we have concentrated on revision so far, a large percentage of the readership will be protesting that we are neglecting the interests of the primary school child. There are many programs created which serve those needs well. Some, alas, are no more. Of the notables which survive all have one feature in common – originality of approach. Sherston Software



produces a wide range of programs which embody this idea. As an example, *Jolly Jack Tar* is the title of a music package for the primary age child. Using Jack as a medium the whole range of rhythm and pitch is explored in a simple and effective way. Sherston also produces adventures, reading programs and

maths work. HS Software is another house which has managed to combine educational validity with a different approach. The end result in its *Adventurous English* set will grab the child's attention and does not easily pall. This is the main advantage over the 'sledgehammers' of the drill and practice brigade.



Deutch Direkt and A Vous La France: linking languages to the micro

Programs that are repetitive, dull and unimaginative will not leave their boxes more than one or twice, unless there is a high level of motivation in the child.

We asked earlier 'What are the needs of your child?' As it is difficult to pin down specific needs which relate directly to the teaching they receive in school, it is important to find general areas that should be covered at home. Traditionally, the child has always brought home spellings, reading books and tables in primary school and a variety of subjects in secondary. With the computer it is generally advisable to cover certain fundamental skills and concepts throughout their school life. Although this list may not be complete and will be the subject of disagreement, broadly speaking its content will be useful.

At infant level children will be finding their way around the keyboard, learning the principles of operating the computer and finding the Break key with monotonous regularity!

- Matching programs develop the sense of shape and form and the skills that come before the complex matchings involved in reading.

- Number bonding is a skill which is developed well by the use of a computer. Constant feed-back with reward and encouragement helps develop basic number concepts which give an understanding that is the foundation of later skills.

- Simple puzzles develop a child's ability to tackle problems and develop ways of solving them (the *Mr Men* series from Mirrorsoft is a good example).

- Language development is promoted by any program which encourages a child to use language (not by typing but by understanding). Simple adventure games provide a medium for several of the skills mentioned above, in addition to language work.

All of the above are specific to skills. They are not dealing with a specific topic such as addition or spelling or words that contain 'ough'. If that specific knowledge arises, it is hidden in the general 'fun' of the package and is learned unawares.

Moving a little higher up the age range:

- Text handling: simple wordprocessing as a means to succeeding with words, even before writing has become second nature. Packages such as *Pendown* from Logotron and *Folio* from Tedimen will provide ample facilities which grow with the user. Not only is this a useful tool in itself, but it also provides a medium in which the child may organise his or her thoughts and prepare work that is to be presented in school. Consider also, if your child has problems with handwriting, that the





# GRIFFEN COMPUTERS

CASTLE WALK, LOWER STREET  
STANSTED, ESSEX CM24 8LP

TELEPHONE: 0279 812295

**INTERSHEET** – The first of the ROM-LINK integrated rom packages from Computer Concepts. Menu driven, 40/80/105 column display, very fast, can be used with View or Wordeise, up to 16 spreadsheet in memory at one time. Supplied on two roms with reference manual, function key strip and quick reference card. **45.95 (a)**

**INTERCHART** – The second ROM-LINK package and designed for Intersheet giving Bar, Pie and Line graphs. **29.95 (a)**

**INTERWORD** – The new wordprocessor from Computer Concepts of the WYSIWYG type. Allows 40, 80 and 106 column mode. **50.95 (a)**

**INTERBASE** – The new rom-link database from Computer Concepts. (available soon). **P.O.A.**

**ISO-PASCAL STAND ALONE GENERATOR** – Allows ISO PASCAL programs to be used on any BBC system. Disc based. Comes complete with manual. **31.95 (a)**

**WORDWISE** – The standard BBC word processor still very popular allowing all normal features for low cost. **30.95 (a)**

**WORDWISE-PLUS** – The new 16k version of Wordwise giving added commands for better use. Using its own language mail merging, indexing, continuous processing and multi column text can be utilised. **44.95 (b)**

**TTS SPEECH ROM** – This rom provides the most powerful and comprehensive speech system available for the BBC Micro. You can make your computer speak by simply typing in what you want to say. Requires Acorn Speech Processor. (Available soon) **36.95 (a)**

**Acorn Speech Processor** – bought with above – **10.00** Otherwise **17.25 (a)**

**MICRO PROLOG** – A logic programming language allowing the use of artificial intelligence techniques. **69.95 (b)**

**PRINTMASTER** – This rom allows Epson or Star printers to be fully utilised easily. Includes a versatile screen dum, enlarged text, various text manipulation commands. **27.50 (a)**

**DISC DOCTOR** – Still a very popular disc utility rom giving many extra commands to any DFS. **27.50 (a)**

**ADVANCED DISC TOOLKIT** – Probably the most versatile & compatible toolkit rom available. It works with the Electron, BBC B, BBC B+, Master, 6502, Z80, DFS, DNFS, 1770 DFS, ADFS. It adds more than 30 extra commands to the BBC. **33.00 (a)**

**BEEB TEXT PLUS** – A unique BBC Micro text-display enhancer. Ideal for eye-catching carousel displays and videotitling. **19.95 (a)**

**ADVANCED DISC INVESTIGATOR** – a very powerful disc utility for standard and non-standard discs. Will back up protected discs and edits any type of non-standard disc. **27.50 (a)**

**FLOPPYWISE PLUS** – A very useful utility rom with a variety of new commands including Clone, Protect, Rom load and many more. **28.95 (a)**

**BROM PLUS** – Enhanced version of the original Brom allowing a whole host of additional commands. Still with the best full-screen editor available. **Rom 31.95 (a)**  
**Disc 27.95 (a)**

**BETABASE** – A very useful database program allowing up to 65000 record to be held. Many features include versatile printing, powerful sorting routines, outputs can be compatible with Wordwise or View. **21.95 (a)**

**BETABASE UTILITIES** – Adds many more features to Betabase including full disc sort, mail merging and many more. **11.00 (a)**

**REPLICA III** – Now enhanced to transfer even more of your tapes to disc. Now uses a data disc so you need only to buy one copy. Even works with the BBC B+. **13.95 (a)**

**BETA-ACCOUNTS** – The first of this integrated suite of programs allows Invoices and Delivery notes to be issue. 80 Column editing, sales ledger sheet automatically generated, multiple VAT rates. Can be used with Betabase. **21.95 (a)**

**PROFILE** – A procedure library allowing up to 100 procedures on a disc, easy merging of procedures with basic programs. **11.00 (a)**

**FONT EDITOR** – Add a further ten fonts to Fontwise Plus aswell as allowing fonts & designs to be edited or created. **17.35 (a)**

**FONTWISE PLUS** – Enhanced version of the original Fontwise allowing more embedded commands. Now gives 12 fonts. **17.95 (a)**

**RAMROD** – A powerful disc, tube, rom and general utility rom working with the B, B+, B+128, Master 128, Turbo & 6502 processors. **Rom 37.95 (a)**  
**Disc 33.95 (a)**

**SPELLCHECK III** – A rom based spelling checker for both View and Wordwise. A dictionary of 76000 words is supplied which can be expanded to over 17000 on a 100k disc. Much faster than the original versions. **28.60 (b)**

**TOOLKIT PLUS** – An updated version of the popular Toolkit rom including a syntax checker and a full screen editor comparable to any other available. **36.65 (a)**

**HELP II** – Now extended to 16k, contains ALL basic keywords, ALL VDU codes, ALL FX codes. **28.95 (a)**

**SLEUTH** – A comprehensive basic debugging rom. It allows single stepping of basic programs, dual screen facility, breakpoints etc. **26.25 (a)**

**EXMON II** – A very advanced machine code monitor which now includes dual screen facility and a full screen memory editor. Also includes single stepping and breakpoints. **26.25 (a)**

**MASTERFILE II** – A general purpose file management package allowing large amounts of its information to be stored and processed. **17.50 (a)**

**VIEW** – Version 2.1 of Acorns wordprocessor. Allows 80 column editing, printing direct from memory etc. **44.45 (a)**

**VIEW PRINTER DRIVER GENERATOR** – Allows you to tailor a printer driver to your own printer. Comes with drivers for FX80, Juki 6100, Olivetti JP101 and others. **Disc — 11.00 (a)**  
**Cassette — 9.50 (a)**

**VIEW 3.0** – A version of View suitable for the BBC+. Comes with a cassette version of the Printer Driver Generator. **68.95 (a)**

**HI-VIEW** – A disc based version of this popular word processor for the 6502 second processor giving 47k of user memory. **44.95 (a)**

**VIEWSHEET** – Acorns spreadsheet rom giving 255 rows by 255 columns, multiple windows, works in any mode, wide use of function keys, fully compatible with View. **44.45 (a)**

**VIEWSTORE** – Acorns new database rom. Works in any screen mode, many powerful sorting facilities, can be spreadsheet or user defined card layout. max record size is 60k. Output can be sent to View and Viewsheets. Comes with comprehensive manual, utilities disc etc. **44.45 (a)**

**VIEWSPELL** – An automatic spelling checker using a dictionary of over 75,000 words. User dictionaries can also be created. **34.95 (a)**

**VIEWPLOT** – This rom will work with Viewsheets and Viewstore to draw bar graphs, line graphs and pie charts. (Available soon). **25.95 (a)**

**GRAPHICS ROM** – Acorns new 16k graphics rom giving many new commands for extensive graphics. Circles, ellipses, arcs, rectangles, parallelograms, segments and sectors etc are all available. Comes with manual and utility cassette. State B of B+ version. **25.95 (a)**

**BASIC EDITOR** – Acorns new editor rom allowing all the normal wordprocessor facilities to be used on basic programs. Features include block copy, block move and use of labels. **27.95 (a)**

**TERMULATOR** – A terminal emulation rom. Emulations provided are VT100, VT52, 4010, teletype, hardcopy and a special BBC terminal. Comes with user guide and a set of function key strips. **29.95 (a)**

**ISO-PASCAL** – A full implementation of the ISO standard supplied on two roms with two comprehensive guides. 6502 disc version also supplied. **54.95 (c)**

**LOGO** – A full implementation of the Logo language supplied on two roms. Comes with manuals, user guide, examples disc and reference card. **54.95 (c)**

**COMAL** – A full implementation of the International Standard for Comal. Comes with comprehensive manual. **44.95 (c)**

**OXFORD PASCAL** – A full implementation of the Pascal language including fully recursive procedures, type definitions and repeat until loops. Compiles down to compact P-code. **43.95(a)**

AA189a

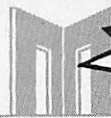




BRITISH BROADCASTING CORPORATION  
MASTER SERIES MICROCOMPUTER



BRITISH BROADCASTING CORPORATION  
MASTER SERIES MICROCOMPUTER



BRITISH BROADCASTING CORPORATION  
MASTER SERIES MICROCOMPUTER

Order from Prestel  
page no. 60043754

## MASTER 128 – NOW AVAILABLE

Master 128	454.25 (s)
Turbo Upgrade	119.00 (c)
Master Econet Upgrade	47.00 (c)
Master 512 upgrade	385.00 (c)
Eprom Cartridges	14.95 (a)
Master Ref Manual Pt I	14.95 (a)
Master Ref Manual Pt II	14.95 (a)

Free with every Master sold, a disc based revolving diary showing 8 months ahead and 3 back. Allows many appointments each day and also permanent reminders to be kept. Runs from sideways ram and very easy to use.

### KAGA TAXAN KP810

A top quality NLQ printer giving 150 c.p.s. draft and 27 c.p.s. NLQ. Fully FX80 compatible, friction and tractor feed as standard. Comes complete with cable and paper

249.00 (s)

Free with every KP810 the Font design package allowing 10 pre-defined fonts or any user defined fonts to be used.

### EPSON LX80

The new low-cost printer from Epson giving 100 c.p.s. draft and 22 c.p.s. NLQ. Fully FX80 compatible. Friction feed standard, tractor unit available. Comes complete with cable & paper.

225.00 (s)

LX80 Tractor Unit	21.00 (c)
LX80 Cut Sheet Feeder	56.95 (b)

### JUKI 5510

A very versatile and fast printer giving 180 cps draft and 30 cps in NLQ mode. Friction & tractor feed as standard. Fully FX80 compatible. Comes with cable & paper.

265.00 (s)

Juki 5510 Cut sheet feeder	235.00 (s)
----------------------------	------------

### JUKI 6100 DAISYWHEEL

A low cost daisywheel giving 20 cps 2k buffer 10, 12, 15 and proportional spacing. Cut sheet feeder and tractor unit available.

275.00 (s)

Juki 6100 cut sheet feeder	189.00 (s)
Juki 6100 tractor unit	135.00 (s)

### VIEW PRINTER DRIVERS

We have printer drivers available for all the above printers

7.95(a)

### FONT DESIGN

A disc based font program allowing any one of 10 pre-defined fonts or any pre-defined font to be downloaded to a Kaga KP810 or Canon PW1080A printer. The 8K ram chip (6264LP-15) must be fitted to the printer. BBC B, B+ and Master compatible.

9.95(a)

### AMX MOUSE

AMX Mouse with Super Art	79.00 (c)
AMX Super Art	47.95 (b)
AMX Pagemaker	47.95 (b)
AMX Desk	23.00 (b)
AMX Database	23.00 (b)

### ROM/RAM BOARDS

ATPL Rom board	37.95 (a)
Pearlree MR 2000 Rom board	13.95 (a)
Pearlree MR 3000 Rom board	17.25 (a)
Pearlree 4200 Rom board	29.95 (a)

### MASTER ACCESSORIES

View 3 guide	10.00 (a)
Viewsheets guide	10.00 (a)
Viewstore guide	10.00 (a)
Iso-pascal (C)	65.00 (a)
Logo (C)	65.00 (a)
Lisp (C)	56.00 (a)
(C)-Master cartridge	

### COMPLETE SYSTEMS

We can tailor-make a complete word-processing system to your particular needs. Phone for more information.

For example.

BBC Master 128

View 3.0 & manual

Hi-Res Green Screen monitor

Dual 40/80tr Mitsubishi drives

Juki 5510 NLQ printer

All cables, a box of discs & paper.

Only 1046 inc VAT

### PLOTTERS

The A4M and A3M plotters plug directly into the Beeb and run a wide variety of software from Linear Graphics and third party companies, eg, Beebugsoft Hershey characters. Ideal for graphics work, PCB layouts, mapping and scanning. There are many add-ons available including optical scanners. Ideal for education, business or industrial applications.

A4M	399.00 (s)
A3M	549.00 (s)
Linsign	22.50 (a)
Linchart	22.50 (a)
Lincad	56.50 (a)
Hershey Characters	21.00 (a)

### MODEMS

Nightingale/Commstar	
1200/75 75/1200 300/300 baud rates, BT Approved. Comes with BBC cable.	133.00 (c)
Pace Nightingale	121.00 (c)
Commstar Software	36.00 (a)
Auto Dial Board	52.00 (c)
Autodial Utils Disc	11.00 (a)

### SPECIAL OFFERS

27256 32K Eprom	1-9	4.75 (a)
	10 +	4.00 (b)
27128 16K Eprom	1-9	2.95 (a)
	10 +	2.60 (b)
2764 8K Eprom	1-9	2.50 (a)
	10 +	2.30 (b)
6264LP-15	1-9	3.25 (a)
	10 +	2.75 (b)
8721 disc controller		40.95 (a)
Acorn DFS 0.9		48.95 (a)
Acorn DNFS 1.2		59.95 (a)
Acorn 1770 DFS		48.95 (a)
Acorn ADFS		28.95 (a)

### DRIVES

Mitsubishi (2yr warranty)	
80tr d/s single	126.95 (s)
80tr d/s + PSU	149.95 (s)
80tr d/s dual	254.95 (s)
80tr d/s dual + PSU	289.95 (s)
80tr d/s dual + PSU in Master Bridge	319.95 (s)
GRW01 –	
20MB Winchester + PSU	755.00 (s)
GRW02 – 20MB Winchester, 40/80 drive + PSU in Master bridge	919.00 (s)
GRW03 – 20MB Winchester, 40/80 drive 10MB Tape streamer + PSU in Master bridge.	1616.00 (s)

### MONITORS

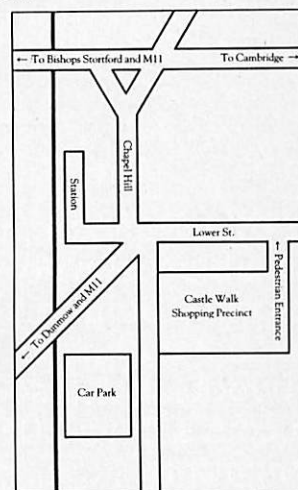
Microvitec 1451 Med Res	265.00 (s)
Microvitec 1441 High Res	435.00 (s)
Mitsubishi 1404 Med Res	265.00 (s)
Philips CF114 TV/Monitor	199.00 (s)
Kaga KX1201G Green Screen	103.00 (s)
Kaga KX1203G Amber Screen	120.00 (s)
Philips 7502 Green Screen	84.95 (s)
Philips 7522 Amber Screen	86.95 (s)
Philips 7542 White Screen	86.95 (s)
Hantarex HX12 18MHz Green Screen	79.50 (s)
All monitors come with a BBC cable.	

### PEARTREE

Profit Accounts package	97.00 (c)
Artist	53.00 (b)
Megamouse	65.00 (b)
Artist & Megamouse	97.00 (c)

### WHERE TO FIND US

We have now settled in our new shop premises in the Essex village of Stansted. We have a host of software and hardware on display so why not come along and see for yourself.



AA188B

ALL PRICES INCLUDE V.A.T. @ 15%  
DEALER ENQUIRIES WELCOME

EDUCATIONAL AND  
GOVERNMENT ORDERS WELCOME

ALL ORDERS ARE DESPATCHED WITHIN  
24 HOURS STOCK ALLOWING

PRICES SUBJECT TO CHANGE WITHOUT  
PRIOR NOTIFICATION

POSTAGE RATES –

(a) 75p (b) 1.25p (c) 2.00

(s) Securior £6.00 service



VISA



# Winchester Users

## *-Discard the Soft Option!*

At last, a real solution to the problems of hard disc back up — the new Amcom Tapestreamers.

Amcom Tapestreamers provide a fast, reliable and economic means of backing-up the large amounts of data stored on Winchester hard disc systems. The speed and ease with which data is streamed onto magnetic tape makes backing-up faster, easier and more convenient with total Data Integrity. Multiple copies are easy to make, and data is quickly transferred back to the hard disc when required.

Amcom Tapestreamers provide:-

- Affordable Winchester Back-up
- Fast Operation (80k/sec).
- Reliable Data Transfer
- Easy Multiple copies.



Amcom Tapestreamers are available to run not only on Amcom's definitive E-Net Winchester based networks, but also on Amcom's new ADFS compatible Winchesters and standard Acorn hard disc systems.

**Amcom for the complete mass-storage solution**



For more information on Tapestreamers, Educational Networking Systems and stand alone Winchesters, contact:

Amcom Software Ltd. 35, Carters Lane, Kiln Farm,  
Milton Keynes. MK11 3HL. Telephone (0908) 569212





computer may release him or her from this problem. Many a child with motor skills and co-ordination problems has found a way out of the cycle of failure in a wordprocessor. It by-passes their problem and allows the correction of errors before the final copy is presented. (See this month's Reviews pages for further information on wordprocessing packages for children.)

● Graphics: the 'picture processor' will allow the child's imagination to run riot. It's more difficult than paper and paint, but it's also different from them as well. The child can concentrate on form and design – no-one would claim that the computer's colour palette is anything but inferior to the paintbrush's. The ability to create, handle and edit a picture is a powerful facility.

● Simulations and decision making: a whole range of materials exist which involve the child in a need to make decisions in a specific context, based on a limited amount of information. This is the stuff of real life. It teaches that responsibility has to be taken for actions. This type of material will apply to your child's development from upper primary throughout secondary school.

● Information handling using databases: I would suggest that this is not a home-based activity unless you can specifically relate it to study going on in the classroom. It requires an integration into other work which is unlikely to be found in the home. General work in structuring information may be a useful pastime such as cataloguing or preserving information on hobby-related topics.

## What about programming?

Programming as a skill is fairly specialised. The comparison has been made in schools between computer programming and the study of Latin. Both are good disciplines, developing structured thought and logical processes, and in the main both are fairly useless in any practical way unless taken to a high level. As I duck to dodge the brickbats, I would say however that my comments refer to Basic programming. It can be fun and it can be an interesting hobby. Studied for its own sake under the heading of 'education' I would say it was a dubious activity, especially if the child is a reluctant pupil.

More satisfactory and rewarding is Logo programming. This develops all the thought processes mentioned earlier but is a language nearer to the spoken word. Statements in Logo are much more likely to make sense than those in Basic. Moreover, the mathematical concepts that develop initially, even with a

simple turtle graphics program, are of far more value than learning to print your name on screen 500 times in multiple colours. Logo is a specialised field. If it is being used at your child's school, then take advice about the version to use and the ideas to develop. Which



**Pendown: a wordprocessing package**

leads us on to the interface between parents' tasks and those of the school.

## Curriculum links

The problem with any work a parent undertakes at home in educational terms, is that it may pre-empt work done by the school. Teachers have even been known to throw up their hands in horror when little Johnny walks through the door on the first day of term able to read! The problem is even more acute with a computer because it relates to specific items of software that may be used both in the home and the school. It is important to work with the school and not in spite of it. Consult with the teachers. You may feel that you are being a nuisance but if you can summarise your aims and objectives on a piece of paper and push it in the right direction you may find that you save both money and effort.

Under no circumstances should you, upon learning that the children are 'doing', for instance, *Granny's Garden* (4mation), dash out and buy a copy. If so, you will destroy the development that the teacher is undertaking. Look for a package which tackles the same subject in a different way. The teacher may be able to advise you.

Above all, concentrate on skills. Specific subject areas may have pieces of software which relate to them. Whether they fit in with the thinking of the school and/or the examination boards is another matter. At home the more generalised idea of developing thought processes, broad concepts and skills will pay dividends in the child's schooling.

Who knows what the future holds? It is impossible to hazard a few interesting guesses however. How long will it be before most

children carry a portable computer and plug in at both home and school? Ridiculous? Just think back to calculators and how ridiculous they seemed 20 years ago. Your child, if he or she is in primary education, will probably have access to on-line databases around the world, interactive video, telecommunications and computers of amazing power. You, the computer owner, have a chance to give a little of the ground work that will help him or her to come to terms with that future by providing the best that the present can offer.

## SUPPLIERS' NAMES AND ADDRESSES

**British Educational Software Associates (BESA)**

4 Little Essex Street, London WC2R 3LF.  
Tel: 01-836 6633.

**BBC Soft**

35 Marylebone High Street, London W1M 4AA. Tel: 01-580 5577.

**Letts**

77 Borough Road, London SE1 1DW. Tel: 01-407 8891.

**Akadimias**

University College of North Wales, Bangor, Gwynedd LL57 2DG.

**John Wiley**

Baffins Lane, Chichester PO19 1UD. Tel: (0243) 784531.

**Medstat**

City House, Maid Marian Way, Nottingham NG1 6BH. Tel: (0602) 411120.

**AVP Computing**

Hocker Hill House, Chepstow, Gwent. Tel: (02912) 5439.

**Chalksoft**

PO Box 49, Spalding, Lincs PE11 1NZ. Tel: (0775) 69518.

**Sherston Software**

8 Court Street, Malmesbury, Wilts SN16 0LL. Tel: (0666) 840433.

**HS Software**

56 Hendrefoilan Avenue, Sketty, Swansea SA2 7NB. Tel: (0792) 204519.

**Mirrorsoft**

Maxwell House, 74 Worship Street, London EC2A 2EN.

**Logotron**

Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.

**Tedimen Software**

PO Box 23, Southampton SO9 7BD. Tel: (0703) 473774.

For a full list of educational software programs and houses, see the May 1986 issue of *Acorn User*.



# University Software

## UNISTAT-II

### MARK 2 STATISTICAL PACKAGE

**\*FULLY INTEGRATED SUITE OF STATISTICAL PROGRAMS FOR ADVANCED APPLICATIONS \*  
DEDICATED DATA PROCESSOR \* MISSING DATA HANDLING \* USER DEFINED LABELS FOR  
VARIABLES \* READING DATA FROM ASCII FILES \* DIRECTION OF OUTPUT TO PRINTER OR  
ASCII FILES \* HIGH-RESOLUTION PLOTS \* COMPREHENSIVE USER MANUAL**

UNISTAT-II Statistical Package consists of the following major parts:

**UNISTAT DATA PROCESSOR:** A column based spreadsheet designed exclusively for data handling and analysis. Features: DATA ENTRY: Cursor editing, overwrite/insert modes, continuous entry, insertion and deletion of cells, columns and rows, go to a specified cell, user defined labels for columns. FILE HANDLING: Reading, writing and merging of internal and ASCII datafiles in time series and/or matrix format. COLUMN TRANSFORMATIONS: Computation of formulas using columns as variables. All BASIC operators and functions (e.g. +, -, \*, /, %, LOG, EXP, SQRT, ABS, SIN, etc.) can be combined in formulas. Columns can be referred to with column numbers or with user defined labels. STATISTICAL COMMANDS: Special statistical commands unique to UNISTAT-II data processor such as SIZE, MIS (number of missing observations in a column), SUM, SSO, MEAN (all adjusted for missing observations) which can be used independently or in formulas. Sorting a column or sorting the whole matrix with respect to a specified column in ascending or descending order. Ranks of any data column. CONDITIONAL FORMULAS: An advanced 'IF' command facilitates selection of cases, creation of dummy and effect variables, recoding, breakdown, etc. Any combination of logical operators (>, <, =, AND, OR, NOT) can be used. ADDITION OF COLUMNS AND ROWS: Addition of output from statistical procedures (such as residuals and/or predicted values from regression) or new variables and observations at any stage.

**MULTIVARIATE REGRESSION:** Matrix of simple (zero order) correlation coefficients, choice of dependent variable, selection of independent variables, nonconstant regression. Regression dependent missing data handling. Number of rows and columns omitted due to missing values and multicollinearity are reported. Output includes estimated coefficients, t-statistics, standard errors on all regression variables, R<sup>2</sup>, adjusted R<sup>2</sup>, standard error of regression, F-statistic, Durbin-Watson statistic, ANOVA of regression, variance-covariance matrix and multiple correlation matrix on estimated coefficients, interpolation, plot of residuals, plot of actual and fitted y values. Addition of residuals and/or fitted y values to data matrix facilitates two or three stage regressions.

**STATISTICAL TESTS:** Significance levels are displayed together with test statistics. Pairs or rows containing missing data are omitted automatically depending on the nature of the test. PARAMETRIC: One sample t, two sample t with equal variances, two sample t with unequal variances, paired t, F, NON PARAMETRIC: Wilcoxon signed rank, Mann-Whitney U (for small, medium and large samples), Kolmogorov-Smirnov, Friedman pseudo two-way

ANOVA, Fisher exact, Walsh, Wald-Wolfitz, Kruskal-Wallis, Page's L, Cochran Q, Goodman-Kruskal gamma, Sommer's d. CORRELATION COEFFICIENTS: Pearson, Spearman's rho, Kendall's tau, Point biserial, tetrachoric. DISTRIBUTIONS: Chi-square, t, F, Normal (standard, non standard), logarithmic normal, inverse normal, bivariate normal, binomial, negative binomial, exponential, hypergeometric, gamma function, Khrgian-Mazin.

**DESCRIPTIVE STATISTICS:** Analysis of raw data or data with frequency counts. Raw data sorted and grouped. Frequency distributions with choice of lower bounds and class intervals. Absolute, cumulative and relative frequencies. Histograms, scatter diagrams and time series plots. Output includes sum, mean, mean deviation, median, variance, standard deviation, third and fourth moments, skewness, kurtosis, range, etc.

**ANALYSIS OF VARIANCE:** One-way (with or without repeated measures), two-way and three-way (with one, two or without repeated measures) ANOVA tables.

**TABULATIONS: CROSS-TABULATION:** Two-way tables with column and row totals and percentages. CHI-SQUARE CONTINGENCY TABLE: Observed, expected frequencies and chi-square values are displayed for each cell. Column and row sums, overall chi-square statistic and its significance level. Yates correction for 2x2 matrices.

**HIGH RESOLUTION PLOTS:** All plots can be dumped on the printer. PLOT OF BIVARIATE REGRESSION: Scatter diagram with optional line of best fit, intercept, slope, R<sup>2</sup>, standard deviation. CURVE FITTING: Fitting of polynomials on bivariate data. Fitted polynomial coefficients, R<sup>2</sup> and standard error are displayed. TIME SERIES PLOTS: Simultaneous plotting of up to 3 columns of data against time (or row numbers). PLOT OF FUNCTIONS: Simultaneous plotting of up to two functions, integrals, polynomials and roots of polynomials.

**DEFAULT SETTINGS:** A menu screen provides the choice of screen display and device control parameters which will be effective during a session. 40 or 80 column display (default 40), number of data drive 0/1/2/3 (default 1), black & white or colour monitor (default colour), width of printer (default 80), high-resolution screen dump command (default \*GIMAGE) maximum formula length (default 60 characters per column), maximum number of columns and rows depending on free memory. Minimum data capacity of UNISTAT-II (for a 32K BBC-B) is approximately 2500 observations.

## PUBLISHED COMMENTS ON UNISTAT (MARK 1)

"Now the research project is finished I can tell you that UNISTAT did all that I expected... During the analysis of our study there was no statistical test needed that was not provided - this I find very impressive on a small micro package." Dr Peter Johnson, A&B Computing, July 1985.

"A useful feature here, that is absent from many general statistics packages, is the ability to enter data in the form of a frequency distribution... the screen layouts are generally very good... error-trapping seems effective and the manual is clear." Eddie Shoemith, The Professional Statistician, Vol 4, Issue 7, August/September 1985.

"UNISTAT: The Rolls Royce of statistical packages." Roger Carus, Acorn User, April 1986.

## \*ALSO NEW FROM UNISOFT LIMITED\*

### LINTPRO Linear/Integer Programming Package.

Written by Dr D. Sprevak

This is a state of the art optimisation package capable of solving very large problems on a 32K BBC micro by means of revised simplex algorithm and efficient vectorisation. In principle there is no limit to the problem size. It can solve a problem with 82 variables, 60 constraints and 15 upper bounds in 24 minutes. Speed of solutions is higher when the package is run on the second processor, Plus or Master series. LINTPRO requires minimal prior knowledge of linear programming techniques and is ideal for real applications as well as for teaching purposes. Data entry is through ASCII files created by any word processor and conforms to the Backus-Naur notation. Optimality of solutions can be set by the user between 0% and 100%. Options include printing of intermediary steps and choice of branching strategies. Output consists of optimal

values of variables, value of objective function, slackness, shadow prices and it can be directed to screen or to a text file.

### CPA Critical Path Analysis

Written by Dr J. S. Dean

A comprehensive coverage of critical path analysis sufficient for most practical applications. Activities and durations are supplied as input and earliest and latest start and finish times for each activity, total float and critical path are obtained as output. Easy editing of inputs provides the possibility of analysing the sensitivity of solutions. A built-in calendar can give dates to any programme. Resources can be allocated to each activity. Suitable smoothing scheme is chosen and a resource bar chart is drawn. Results can be directed to printer or to text files. High-resolution plot of the node structure can be dumped on suitable printers.



BRITISH  
BROADCASTING  
CORPORATION  
MASTER SERIES  
MICROCOMPUTER

## UNISTAT-II: £125+VAT, LINTPRO: £75+VAT, CPA: £50+VAT.

Prices include post & packing within the UK. Official (government, university, local authority) orders are welcome. For orders from Europe add £5, from outside Europe £10. Programs make full use of Master's advanced features and are available in either 40 or 80 track format. Please send cheques and correspondence to:

UNISOFT LTD, P.O. Box 383, Highgate, London N6 5UP.

UNISTAT-II, LINTPRO AND CPA WILL BE AVAILABLE SOON FOR

**AMSTRAD PCW8256, PCW8512,  
IBM PC/XT/AT AND COMPATIBLES**



# EDUCATION SHALL WE TALK?

Econet is a superb communications medium.  
We examine its potential in schools.

**Robin Newman**



One of the features which singles out the Acorn Econet from many other rivals, is its ability to allow direct machine-to-machine communication between stations on the network, as well as the more conventional link between network station and fileserver. Sadly this facility is all too often not used through ignorance of its power.

Even Acorn only pays lip-service with just three utilities, view, notify and remote, which exploit this feature in the standard Network Library, together with PROT and UNPROT which control their use.

However, extra utilities are appearing from a variety of sources which make full use of these facilities. I hope to review these in forthcoming issues, and would welcome comments from readers who have used them.

What can you do with them? Imagination is really the only limiting factor. Perhaps an illustration of the scope of the utilities used at

Oundle School (some home-grown, others from elsewhere) will illustrate this.

One useful feature incorporated in most utility add-on packages is the ability to force a number of different stations to load and run the same program. This is also usually included in other non-Acorn networks, since it is possible to control it via the fileserver. A more general extension allows any sequence of commands to be executed by a selection of machines eg:

\*IAMFRED  
\*DIRMATHS  
LOAD "NUMBER"

A complementary facility is the ability to FETCH a program from one machine directly to another.

There are several facilities which enable a teacher to control the use of the network by the pupils. One is the ability to disable either the keyboards, screens or both of pupils'

machines. It is also possible to put one machine in control of the keyboards of several others simultaneously (an extension of \*REMOTE) which is useful when illustrating the editing features of wordprocessors.

The network is a superb communications medium. Facilities have been developed to allow a 'conference' arrangement whereby six or nine machines can talk to each other simultaneously, each having a two or three line display on the screen, each display being duplicated on all machines.

Felsted School has developed a noticeboard system which uses Econet to send messages to a series of machines with large monitors scattered throughout the school. Its large network is 2.5km long (incorporating several network 'bridges'), so it saves a lot of walking! It has also developed a chatline system, similar to that found on many phone-in bulletin boards. Indeed, even Acorn sells a 'mailbox' type sys-



PRINT YOUR OWN  
**T-SHIRT**  
in Black or Colour

Simply replace present ribbon with a TRANSFER ribbon in your Printer then 'Dump' your Screen MASTERPIECE to ordinary paper and IRON onto the Fabric.

Permanent & Washable!  
**£18.00 Black**  
**£23.00 5 Colours**  
Dealers Wanted in UK  
Special School Prices

IDEAL for Schools, Plays  
Sponsored Events, Clubs

Get up to 50 T-Shirts  
from each printer ribbon

**AVAILABLE FOR PRINTERS**  
Epson FX80/MX80/RX80:HEC0023:Star Radix 10:  
Apple ImageWriter:Commodore 4022 & 8022:  
IBM PC 5152:Okidata82/92:Gemini 10X

Clearly state which  
printer you require!

CWO to: Banbury Business Computers  
3, Schofields Way, Bloxham, Banbury, OX15 4NS  
Telephone (0295) 728017

**DEV-ICE**  
ELECTRONIC CONTROLS LIMITED

**DEV-ICE**  
REAL TIME IN CIRCUIT  
EMULATION FOR LESS THAN **£500**



Design and development of  
microprocessor based systems often encounters problems  
when software and hardware are brought together.

DEV-ICE offers an excellent cost effective solution.

- Transparent operation.
- Supports 6502, 65C02, 6501 & 6511
- Resident assembler/ disassembler.
- True breakpoint capability.
- Delayed (up to 65536 occurrences) breakpoint.
- Modify: any memory location, CPU registers or Peripheral I/O device.
- Single stepping mode.
- No external power supplies.
- Target program can be halted and restarted at any position.
- Operates with any terminal via RS232 link.
- Software packages available to turn the BBC Micro into a powerful development system.

• £495 + VAT.

**DEV-ICE**  
ELECTRONIC CONTROLS LIMITED

Unit 2B Poole Hall Industrial Estate Ellesmere Port  
South Wirral Cheshire L66 1ST Tel: 051-356 3767

CHALKSOFT \* GARLAND \* STORM \* CAMBRIDGE \* H&H \* GOLEM

**Looking for the RIGHT Software?**  
You need the newly published 72 page  
**EDUCATIONAL SOFTWARE DIRECTORY**

- \* Widest selection of programs — over 500 for the BBC and other computers
- \* Full program descriptions with screen shots
- \* Easy ordering and competitive prices

Write or phone for your free copy today  
**Rickitt Educational Media**  
Ilton • Ilminster • Somerset TA19 9HS • (04605) 5152

BBC PUBLICATIONS \* SHERSTON \* AMATION  
SELECTIVE \* MACMILLAN \* ASK \* CLOUD 9

AKADIMIAS \* FERNLEAF \* BOURNE \* SCISOFT \* JACARANDA \* SULIS

**Educational Software**  
NOW MASTER AND GCSE COMPATIBLE

**LCL**

**MICRO FRENCH**

**NEW**

A COMPLETE FRENCH LANGUAGE COURSE  
OF 24 EASY TO USE PROGRAMS  
FOR O'LEVEL SELF-TUITION OR REVISION

For any BBC Micro, Electron  
(Tapes, 40/80 track discs  
Econet compatible)  
Commodore 64, ZX Spectrum, Amstrad PCW,  
unexpanded Vic, ZX81, Apple, PET, Amstrad

**IMMEDIATE DISPATCH**

Send coupon, or phone orders or  
requests for free colour catalogue to:  
LCL (DEPT A) Melody House, Greys  
Road, Henley, Oxon. Tel: 0491 579345  
or 0784 58771 (10am-10pm)

**£5 off total for 2 courses,  
£10 off for 3, £17 for 4**

**MICRO FRENCH (NEW)** (BBC, Electron) 24 program self-tuition  
GCSE ('O'-level) course with real speech, prepares you for both oral  
and written exam. 2 discs/tapes, 2 books + voice tape £24.

**MICRO MATHS** 24 program revision or self-tuition course taking  
beginners (from 8yrs) to O-level. (GCSE) Includes 59 topics on 2  
discs/tapes plus two books (now has more colour graphics). £24.

**MICRO ENGLISH** (BBC, Electron, Amstrad). Complete English Lan-  
guage self-tuition and revision course, to O-level, (GCSE) of 24  
programs. Includes "Speak-and-Spell" with real voice. £24.

**MEGA MATHS** (BBC, Electron, Amstrad). 24 program step by step. A-  
level course of 105 topics for mature beginners, A-level students and  
Micro Maths users (2 discs/tapes & 2 books). £24.

**WORLD LEADERS IN COMPLETE SELF-TUITION  
COURSE SOFTWARE (IN 24 COUNTRIES)**  
Excellent reviews

NAME ..... ADDRESS .....

TITLE ..... COMPUTER ..... 40/80 Disc/tape

**VERSATILE CAD/CAM**  
For the BBC Micro

A sophisticated, menu driven, user friendly CAD/CAM package with many facilities for very  
accurate drawing construction and data extraction for Numeric Control (NC) post processing.

**CAD System (EDUCAD) — £80 (ex. vat)**

- \* geometric/schematic drawings
- \* zoom, scale and units control
- \* text/symbols, any size and angle
- \* mirror and duplicate
- \* generalised x-y plotter output
- \* area properties
- \* construction/modification
- \* text/symbol font editor
- \* intersects and tangents
- \* rubber banding
- \* graphics screen dump
- \* revision/material info. editor

**CAM System (EDUCNC) — £35 (ex. vat)**

- \* part geometry from EDUCAD
- \* tool path animation
- \* part profile definition
- \* generalised NC post processor

Both packages have explicit input prompts and error messages. This together with over 80  
pages of online HELP data makes these systems easy to use and easy to learn — an ideal way  
of introducing this new technology.

TO ORDER simply specify disk format requirements or to obtain further details contact:  
**EDUSOFT, 15 Tamworth Business Centre,  
Amber Close, Amington, Tamworth, Staffs B77 4DS**

AA270

## Carswell Computers

Elm Road, Faringdon, OXON SN7 7EJ. Tel (0367) 21153

TYPEASY Version 4

- Better than ever touch typing course BBC B, B+
- Mistakes displayed with flashing letters
- Teaches correct finger movement
- 139 progressive exercises plus routines for writing more yourself
- Displays errors, speed and performance

disk (40 or 80 track) £15, Econet disk (80 track) £30, cassette £6 inc p+p

TYPE INVADERS

- Increases your speed — we guarantee!
- Letters words rain down faster and faster. So blow them up by typing correctly
- 10 levels with 4 speeds plus colour and sound

disk (40 or 80 track) £12.50, Econet (80 track) £25, cassette £7.50 inc p+p



tem, although they don't seem to have admitted to it in any ads!

One pair of utilities we use frequently at Oundle enables several machines to be synchronised together by a 'pulse' sent round the network. This is useful when playing music programs. The code involved is fairly compact, and the idea was first developed by Dave Bisset (ex-Felsted School). Listing 1 on the yellow pages is the controlling CONDUCT program, and listing 2 should be added to the program which you wish to synchronise. This is most conveniently done by typing in the listing (minus the example program in lines 10-14) and spooling it to a text file, which can then be \*EXECed on to the program you wish to be synchronised, eg having typed in the listing type:

```
*SPOOL SYNC >return<
```

```
LIST >return<
```

```
....
```

```
....
```

```
....
```

*(when listing is complete)*

```
*SPOOL >return<
```

Now load in the program to be synchronised, and make sure that its line numbers are compatible, ie, there should be none before line 10 and none after 9990.

Finally type \*EXEC SYNC, and the sync lines will be added to the program, which can then be saved.

To use the system, load the program into as many machines as you require, and run it, whereupon these machines will appear to go dead. In fact they are continually looking at the network, waiting for a synchronising pulse which is provided by the program CONDUCT, which should be run on another network machine to start the ball rolling.

If you don't want to wait for the reviews and want to get some network utilities straight away then try the addresses at the end, all of which can supply ones to suit a variety of tastes and pockets.

## Mastering your network

With the advent of the new Master series machines I was anxious to get one on the network to find out what the compatibility problems were. In the event, I have been pleasantly surprised, and Acorn has done a good job in ensuring that the new machines will fit in with existing networks of model B machines. That's not to say that there are no problems, and the following points may help you to avoid the pitfalls.

Initially I was concerned to read in the machine 'spec' that pages &B and &C were to

be allocated as network workspace. Much of our software used these pages in an illegal manner (officially they should only be used for function key and character definitions), and I saw the prospect of much rewriting. In the event I found that Acorn had provided the facility to reconfigure the Master so that it behaved like a model B. It is possible to raise the default value of page from &E00 to either &1000 or &1200, thus freeing pages &B and &C. This is achieved by using the configuration command \*CONFIGURE SPACE (raises page to &1000) and \*OPT 6,1 a further &200 to &1200. Both these commands take effect following a subsequent Control Break.

Alternatively the single command \*FX162,17,5 followed by Control Break achieves the same result. One other reason for doing this is that existing network utilities like \*NOTIFY, VIEW, etc, use page &E00 as workspace. The results on a Master will be embarrassing! Acorn does provide an alternative set of utilities for the Master machines which use workspace at &DD00. An additional facility allows the Masters to select these automatically from a second library directory.

The speed of data file handling is impressive on the Master, thanks to the ANFS chip, and the slow speed problems of the model B with BPUT, BGET, and PRINT and INPUT are a thing of the past.

The main problem I have found in converting network software for Master use, has been in those programs which \*LOAD or \*SAVE function key or character definitions in page &B and &C. I should emphasise that this is a general problem with the Master regardless of whether you use network or disc. The difficulty occurs because of the desirability of using one network program, and not a variety of different machines. The solution is fairly straightforward for character definitions, as it is merely a matter of relocating them to the correct place in the memory map &8900 to &8FFF.

The new Reference Manual Part 1 indicates how the latch ROMSEL &FE30 is adjusted to access the relevant section of memory by setting bit 7 of the latch (see section F.2). This must be carried out from assembler, as the Basic ROM will be paged out during access to the character definition RAM. An example program is shown in listing 3 which transfers page &C to &8F00, the location for characters 224 and 255. In use, some character definitions saved on a model B (eg, \*SAVE chars C00 +100) are \*LOADED into the Master at the same address, whereupon the command \*SHIFT will run the utility to move them to

the correct place in the memory map for characters 224 to 255.

Dealing with function key definitions is harder. Not only do they have to be relocated to &8000, but they are stored in a different format. This is because the soft key buffer has been increased to 1k, allowing longer key definitions. The pointers to the function key strings also behave in a different way when key definitions are deleted or added. The length is no problem, provided that the key definitions are kept to a length compatible with that of the model B, which will be the case if they originate in a model B.

I have developed two utilities, \*KBM and \*KMB, which automatically transfer key definitions loaded at page &B in model B format to the new format at &8000 in the Master, and vice versa. These can be selected automatically by reading the MOS version, and hence machine type, using \*FXO, for example:

```
A%=0 X%=1: T%=(USR &FFF4 and &FF00)/&100: IF T%=3 OR T%=4
```

```
THEN *KBM
```

T% will be 3 for a Master 128 and 4 for a Master ET. KBM transfers key definitions from model B format loaded at page &B in a Master to Master format at &8000. KMB transfers the definitions in the opposite directions from whence they can be \*SAVED.

Finally thank you to those who have written to The Network Page. Please keep your comments, suggestions and problems coming, so that the page can reflect your interests.

## NAMES AND ADDRESSES

Acorn Computers, Cambridge, Technopark, Newmarket Road, Cambridge CB5 8PD.

Broadway Electronics (Mushroom Software), Aston Road, Bedford, Beds MK42 0LJ.

Digital Services Ltd, 159 Havant Road, Drayton, Portsmouth, Hampshire.

Felsted Computer Department, Felsted School, Dunmow, Essex CM6 3JG.

LTS Ltd, Haydon House, Alcester Road, Studley, Warwickshire B80 7AP.

MUSE, PO Box 43, Houghton-on-the-Hill, Leicester LE7 9GX.

The Microelectronics Centre, Blackpot Lane, Oundle, Peterborough PE8 4AT.

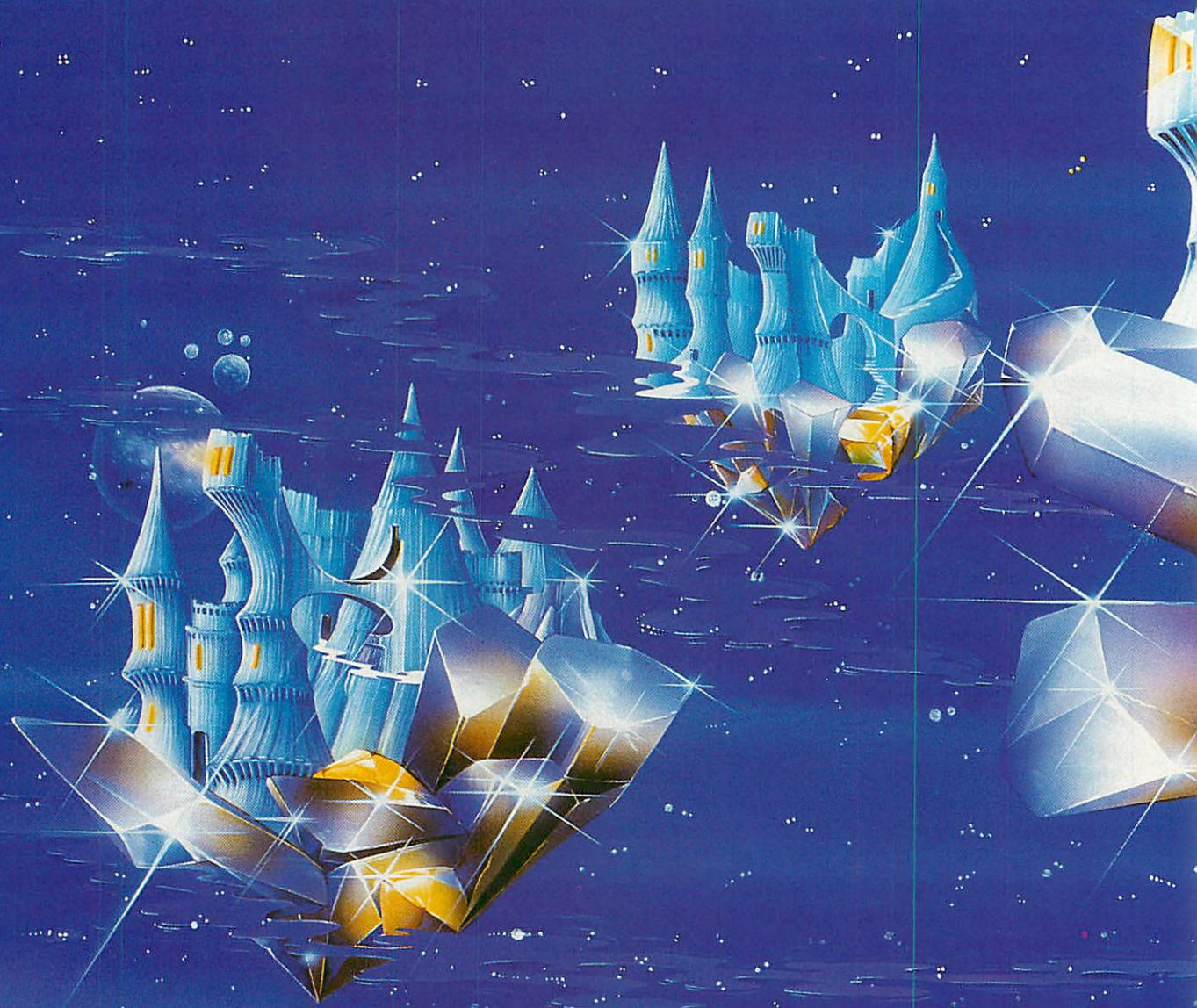
SJ Research, 108 Mill Road, Cambridge CB1 28D.

XOB, Balkeerie Cottage, Eassie, Angus DD8 1SR.

Apologies to any others missed out through my ignorance, drop me a line.



**T**he Legend is born. Summer '84, a computer game was created, a game that made the blood of all who played it flow through icy veins. It travelled through the dusty vaults of the software underground, surfacing here and there, creating a Legend. Next month the Legend will be born. Crystal Castles Diamond Plateaus in Space. Crystal Castles is a once in a lifetime opportunity to experience a true software legend. A legend that will continue because it is to be produced as a Limited Edition. Now that you've heard of it you must buy it otherwise you'll have missed a true software experience.



CRYSTAL CASTLES



*"When I first saw Crystal Castles, its shock waves almost knocked me off my feet. That was so long ago. I cannot conceive that you will ever buy it in a shop. I'll believe it when I see it!" "It's like a state of manic hysteria on diamond plateaus in deep space – some things are beyond description:" Julian Rignall*



Available on: CBM 64/128  
ELECTRON  
BBC

Coming soon: Spectrum 48K  
& Amstrad.

CASSETTE £9.99 DISK £14.99



# Our NEW range of computer workstations are guaranteed to be in a class of their own

Spending money on computer workstations is a serious business, and we're so confident that our new range of Klick superframe workstations will meet with your approval that we're offering a two year guarantee with each unit purchased.

Designed especially for schools in co-operation with Advisers and Resource Centres, Klick is now on the Recommended Equipment list of almost every LEA. So before you make the decision to purchase a computer workstation, take a close look at what every Klick workstation has to offer and we guarantee that you won't be disappointed.

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Ergonomically correct monitor/keyboard relation   | <input checked="" type="checkbox"/> No sharp corners                           |
| <input checked="" type="checkbox"/> All round safety bars to protect equipment  | <input checked="" type="checkbox"/> Perfect mobility with high quality castors |
| <input checked="" type="checkbox"/> Rigid hand welded framework coated with high gloss epoxy paint                            | <input checked="" type="checkbox"/> Comprehensive range of accessories         |
| <input checked="" type="checkbox"/> High density furniture grade chipboard worktops properly faced edged and counter balanced | <input checked="" type="checkbox"/> 2 year guarantee.                          |



# Klick Superframe

Still Britain's best selling workstation range

For further information about the Klick range of products contact:  
**Store Stock Systems Limited** Claverton Road, off Floats Road,  
 Wythenshawe, Manchester M23 9NE Telephone 061-998 9726

## Termite BBC $\mu$ Precision Analogue Control Station

- Precise action joystick utilising an entirely electronic angle sensing technique.
  - Low friction – Backlash free – Self centering.
  - Zero sensor wear rate.
  - Outstanding durability – Lifetime 10 Million cycles.
  - Span Set Controls – Movement sensitivity adjustable within a nominal 0.5 to 2.0 range – X and Y axes independent.
  - True centre zero adjustment – Calibration program included.
  - Converter reference lock eliminates stick drift.
  - Twin auxiliary rotary controls allow additional parameter adjustment within running program – Fine resolution plastic track potentiometers – Double as second joystick channel.
  - Remote Fire and Secondary buttons in compact handheld unit on coiled cable – Positive switch action.
  - Analogue Port connection – Standard configuration – BBC powered.
  - Robust aluminium and steel case in BBC colour – Utility handle.
  - Compatible with all BBC models.
  - Applications: Industrial – Educational – Serious Home User.
  - Full technical and application details supplied – available separately on request.
- Price: £109.00 (incl. p. & p.). Please allow 28 days for delivery  
 Cheques should be made payable to: Wee Beasty Electronics.



**Wee Beasty Electronics**

30 Gladstone Avenue Loughborough  
 Leicestershire LE11 1NP Tel: (0509) 236805

DATA MODEM  
 VERSION AVAILABLE

## CommuniTel

Available soon...

For existing users, an ADFS version and a set of utilities to support your database.

CommuniTel is an exciting professional viewdata system for the BBC Micro.

A joy to use and a boon to schools, the system comprises a comprehensive suite of programs which enables the creation of on-line (and off-line) databases and has direct electronic mail facilities.

Now, any user can create their own viewdatabases and tele-software, and explore the world of electronic publishing and information services.

The system already supplied to:

- The Prestel Education Service
- The UK Dol ITEC Programme
- The Radio Society of Great Britain
- Advisory Unit for Computer Based Education, Hatfield
- Educational Computing magazine
- Microelectronics Education Programme
- All secondary schools in Nottinghamshire

Prices: Level 1 + £55 Level II £375 (inc. Modem)

Educational discounts available

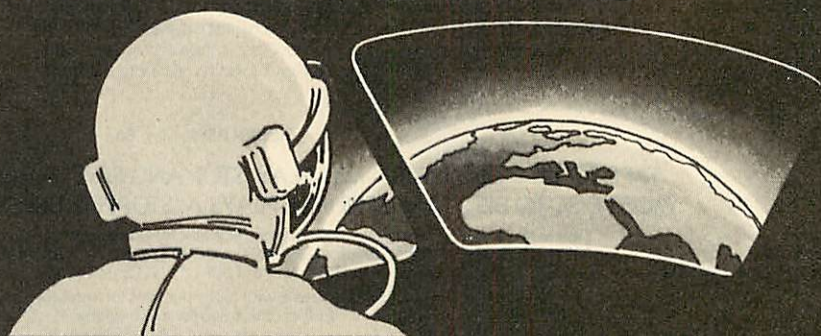
For further information and a demonstration contact:  
 CommuniTel Ltd 189 Freston Road London W10 6TH  
 Telephone: 01-960 7998

.... reflect on it ....

# CommuniTel



# EXPLORE THE EXCITING WORLD OF COMPUTER GRAPHICS WITH THE UNIQUE LOW COST



# GRAFPAD 2

## The Ultimate in graphic input devices for the BBC microcomputer

### New Style. New Technology. New Software.

A New powerful Art package for the BBC B and BBC Master Micros. The unique GRAFPAD 2 Digitiser Tablet and New System 1 Rom Art Software combine to give Colour Graphics a new meaning.

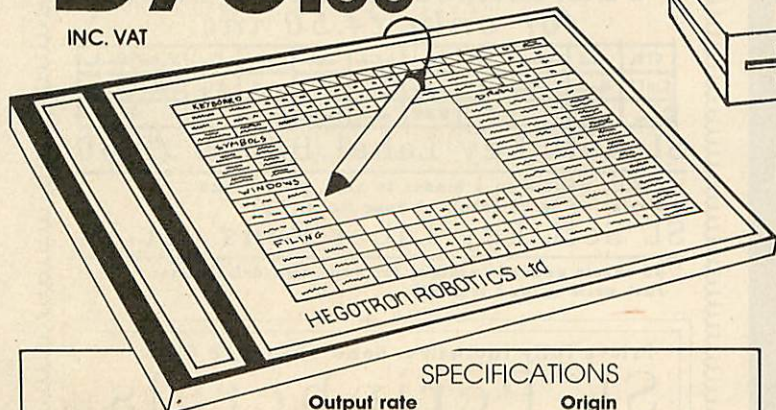
All the facilities you require for the most complex and exciting graphics. Fast, Easy to Use, all commands selected directly from the Tablet, even Text and Numerics! Just point the Pen and click the switch. No need to touch your Keyboard. Draw and Paint in numerous colour and pattern combinations. Copy, Invert, Mirror and Flip any part of your picture.

Define your own Symbols and Colour Patterns. Built in Print Routines

GRAFPAD 2 and SYSTEM 1 ROM and Disc Software.

# £75.50

INC. VAT

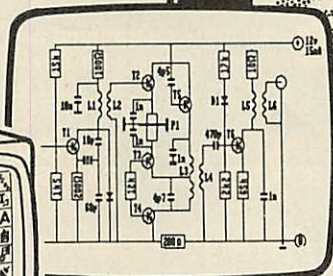
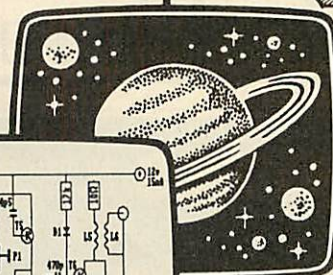
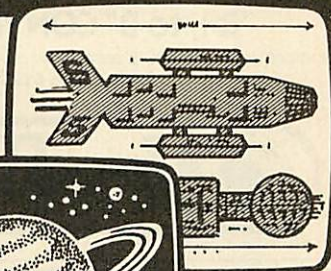


### SPECIFICATIONS

**Resolution**  
1280 x 1024 pixels  
**Repeatability**  
1 pixel

**Output rate**  
2000 co-ordinate  
pairs per second  
**Interface**  
Parallel

**Origin**  
Left-hand corner  
or selectable  
**Dimensions**  
350 x 260 x 12mm



### Applications include:

- Option Selection ● C.A.D.
- Form Input ● PCB Design
- Data Collection ● Education
- Picture Creation ● Picture retrieval ● Games
- Construction Design
- Logic Design

Available from most  
Computer Dealers or  
direct from Grafsales Ltd.

TO: GRAFSALES LIMITED  
Unit Q2, Penfold Works, Imperial Way, Watford, Herts. WD2 4YY.  
Telephone: (0923) 43942 Telex: 946024

AU10

Please supply me with \_\_\_\_\_ GRAFPAD 2(s) for my BBC B/MASTER\*  
at \$75.50 plus £2.50 p&p, or plus £10 for Datapost.  
(Please allow 28 days for delivery).

\*Tick whichever is applicable

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

I enclose cheque value £ \_\_\_\_\_

If you prefer to pay by Access or Barclaycard, please state which...

BARCLAYCARD/ACCESS Card No. \_\_\_\_\_





## The Acclaimed Utility for Tape to Disc Transfer

"REPLAY is a pretty marvellous device, more than a toy for those who have to document software, very useful if you can only buy a tape version of a program (it doesn't matter what nooks and crannies the code is packed into) and a good opportunity to have fun with the screens of your choice. A liberating piece of software and highly recommended."

'Software Reviews',  
A & B Computing, Dec. '85.

"REPLAY is the current state-of-the-art answer to tape to disc transfer, available for the BBC B (and B+). This consists of a ROM and some hardware which must be attached inside the computer. Once installed it will cope with virtually any program you care to put to the test."

'First Byte',  
ACORN USER, May, '86.

"Many facilities are advertised to enable BBC micro users to copy or back-up protected programs and transfer them from tape to disc. While some break the protection in the process and thus assist software piracy, others are more responsible, using techniques which retain the protection. Vine Micros, who already leads the field in the latter group with the T.D.ROM,

now supplies REPLAY."  
'ROM Roundup',  
MICRO USER, July, '86.

TAPE TO DISC TRANSFER – MID-PLAY 'STOP AND SAVE' – MID-GAME PAUSE FACILITY  
MOST DISC TO DISC TRANSFER – DISPLAYS A 'STOPPED' SCREEN READY FOR PRINTING.

Easy to fit with no soldering, uses one sideways ROM socket with three simple connections on to computer.

REPLAY must be matched to the DFS in use: R8271 – Acorn 8271, Pace and Watford S/D: R8272 – U.D.M. DFS: R1770 – Opus 3.45 and Solidisk Issue 1 board: R1770A – Acorn 1770 DFS and ADFS, also Solidisk Issue 2 board: R1770B+ – BBC B+ : R1770C – Opus Challenger: R1770W – Watford DDFS: R2791 Opus 3.15: R2793 – Opus 3.35: R8877 – Cumana QFS: (Acorn 'Master' in preparation).

Price £35.00 inclusive, with full instructions for installation and use.  
Further details and reviews available.

## The MATRIX ROM BBC 'B', B+ and ELECTRON

This ROM will be of interest to Engineers, Scientists and Mathematicians. Using BASIC commands it is an indispensable tool for performing matrix operations and the solving of linear simultaneous equations. The MATRIX ROM was written with the co-operation of the Civil Engineering Dept., University of Southampton.

Price: £36.00 (plus VAT) includes Manual. Quantity discount offered. Further details can be provided on request.

## "B+ to B" CONVERSION KIT

This addition will enable BBC 'B' tapes to be used on the B+ computer. (requires 1.20 O.S. ROM) Price: £15.95 inclusive.



## WRITE-PROTECT SWITCH Acorn 'Master'.

A small module which plugs into the computer and offers write-protection to the sideways RAM banks. Price: £8.95 inclusive.

## The ADDCOMM ROM BBC 'B', B+ and ELECTRON.

A Toolkit/Graphics utility adding 40 extra BASIC commands. Brilliant programming and value for money. 16-page brochure and reviews sent on request.  
Price: £28.00 inclusive.

All items direct from:

VINE MICROS, MARSHBOROUGH, SANDWICH,  
KENT CT13 0PG. Tel: 0304 812276.

Or through your local Dealer.



## DISKETTES

All discs guaranteed and have lifetime warranty.

### DATALIFE

	10 of		10 of
40tk SSDD	£15.25	40tk SSDD	£11.00
40tk DSDD	£19.50	80tk DS Quad	£13.50
80tk Quad	£25.50		

### BULK PACKS

by leading manufacturers such as Sony, Maxell, Fuji etc.

	10 of		10 of
5 1/4"		40tk SSDD	£9.50
		80tk DS Quad	£11.50
3 1/2"		SS 135tpi	£21.50
		DS 135tpi	£25.50

All discs supplied in library case.

Add £9 for a 50 capacity storage box with smoked perspex lid dividers and non-slip rubber feet.

ACORN INTERFACE	£46	ALL PRODUCTS
ACORN DNFS	£60	CARRIAGE FREE
8271	£35	VAT INCLUDED
		NO MORE TO PAY

## ALL-TEC LTD (AU)

84 Highfield Road, Romford, Essex RM5 3RU  
Telephone: 0708 27043

## SL Sideways RAM Module

- High quality 16k CMOS SRAM module
- Easy to fit. Comprehensive manual
- Mount inside, outside or in keyboard fascia
- Read and write protect switch built in
- Internal battery backing option £4

All inc. price only £18.95

## SL VOLUME CONTROL

- Slide volume control for BBC
- Provides control over all software
- Fitted in minutes in rear slot of case
- No soldering • Just two clips to connect

Guaranteed to Stun Zaps  
for only £4.50 inc.

CTRL	and	probed	soft	key	labels	with	SL	Key	Label	Books
SHIFT	these	samples	of	paper	for	SL	Soft	Key	Label	Pads

## SL Soft Key Label Books £3.00

Plastic wallets on a binder to hold, protect and display up to 10 labels at your finger tips.

## SL Soft Key Label Pads £1.50

50 sheets padded together for your own definitions.  
Just write in and tear off.

Prices fully inclusive. Send cheque/P.O. to:

## SL Peripherals

19b Hammeton Road, Bromley, Kent. BR1 3PZ



# PART EXCHANGE YOUR BBC FOR ANYTHING WE CARRY IN STOCK

ALLOWANCE ON YOUR OLD MACHINE



<b>AMSTRAD</b>	
PCW8256 .....	£458.85
PCW8512 .....	£573.85
<b>BBC MASTER 128</b> .....	<b>£449.00</b>
TURBO UPGRADE.....	£125.00
WRITE PROTECT SWITCH	
FOR MASTER .....	£9.95
<b>CUMANA DISK SYSTEMS</b>	
CSX100L .....	£79.95
CSX400S .....	£125.35
CS100 .....	£102.35
CS400 .....	£159.85
CD200 .....	£188.60
CD800S .....	£251.85
<b>PRINTERS</b>	
KAGA KP810 .....	£263.35
CANON PW1080A .....	£286.35
PJ1080A .....	£458.85
EPSON LX80 .....	£217.35
JUKI 6100 .....	£251.85
6200 .....	£516.35
<b>MONITORS</b>	
<b>MICROVITEC</b>	
1431 .....	£193.20
1451 .....	£251.85
1431AO .....	£251.85
1451AP .....	£286.35
KAGA/TAXAN 12" .....	£113.85
PHILIPS 12" .....	£90.85

We will accept your BBC computer, any age, any condition, even non-working, in part exchange for any product we normally hold in stock. This offer applies to both BBC products and Amstrad computers.

A selection from our product range is shown here, and as you can see, our prices are very competitive. The allowance you can expect for your machine is detailed in the table opposite.

Just send your BBC (and manual please) to us with a cheque or credit card number, and provided we have the item you require in stock (please phone to check), it will be sent by return.

This offer means that Compshop has a number of second hand BBC 32K machines for sale, all with 3 months warranty. So if you want a BBC but can't afford a new one, phone us for prices and availability.

ALL PRICES  
INCLUDE VAT

CARRIAGE ON ANY ITEM  
POST - £3.00 COURIER - £10.00

	MORE THAN TWO YEARS OLD	TWO OR LESS YEARS OLD
WITHOUT ACORN DISK INTERFACE	£125	£175
WITH ACORN DISK INTERFACE	£175	£225

PLEASE DEDUCT £25 IF YOUR  
BBC HAS ANY FAULTS

**COMP SHOP PRICE PROMISE**  
— We guarantee to match the price on equipment offered from stock through any other supplier.

Educational enquiries and orders welcome.  
Quotations given.

One year warranty on all products.

COMP SHOP was established in 1978 and has continually offered the best in micro computers to discerning customers.

We sell only computers and peripherals, and therefore can offer the support many other shops cannot.



14 Station Road, New Barnet, Hertfordshire, EN5 1QW  
(Close to New Barnet BR Station - Moorgate Line)

Telephone: 01-441 2922 (Sales) 01-449 6596 Telex: 298155 TELCOM G  
OPEN (BARNET) - 10am - 7pm - Monday to Saturday

NEW BRANCH OPEN AT:  
311 London Rd., Camberley, Surrey GU15 3HE  
Telephone (0276) 22677

FREE MICROLINK  
REGISTRATION  
WITH EACH  
MODEM SUPPLIED

## DEMON modem

NEW MASTER VERSION NOW  
AVAILABLE

### DEVILISHLY CLEVER FEATURES

#### Auto Answer

The Demon answers, then unloads or downloads data into your micro and printer just like a telex.

#### Auto Dial

Numbers dialled by the micro. Doesn't even need a telephone attached.

#### Auto Redial

The dial disk allows you to set your favourite numbers and keeps dialling until you are connected.

Full UK, European & USA  
CCITT V21 & V23 Bell 103 & 202

#### Baud Rates

300/300 Bulletin Boards, etc.  
1200/75 Prestel, Micronet, etc.  
75/1200 Reverse Prestel, etc.

#### Bulletin Board Facility

Start your own contact information boards throughout the world.

#### PSS

Packet Switching Service lets you dial worldwide databases for the cost of a local call.

#### Complete with Plugs + Leads

For telephone, BBC 5 pin DIN RS423 and mains power supply.



Still  
the lowest  
cost fully  
automatic  
modem at

**£59.95**  
plus VAT & p&p

### EASY TO USE?

You don't need to know anything about baud rates or protocol or 'handshaking' simply plug it in and talk to the world.

### Direct from the Manufacturer

By selling it directly we are able to offer it at this low price and still give you support should you need it.

We also have complete control of the quality and build it to the same standards as the products we supply to BT and whilst this modem is not yet BT approved the components we use are.

We also offer a money back guarantee now extended to 12 months for registered users.

PROHIBITED from direct or indirect connection to public telecommunication systems. Action may be taken against anyone so connecting the apparatus.



Dataphone Ltd., 92 The Plain, Epping, Essex  
CM16 6TW. Tel: (0378) 78047

Please send me:

..... (Qty) Demon Modems @ £72.39  
..... (Qty) Demon BBC ROM @ £24.

BBC Model B ☐ Master ☐ Please tick or Special Offer

..... (Qty) Demon Modem and ROM @ £94.95  
..... (Qty) Demon Dial Disk @ £4.95

..... (Qty) Demon Adaptors (allows telephone and modem to plug into same socket) @ £5.25

I enclose a cheque to the value of £ .....

or ☐ No. ....

Signature .....

Name .....

Address .....

.....

Postcode ..... (please print)



# Softlife

## LOW COST - HIGH QUALITY - PRODUCTS FOR THE BBC MICRO

**EPROM PROGRAMMER:** programs 2764, 27128, 2764A and 27128A eproms. Operating software supplied on eprom. ROM formatting facility **£69**

**NUMERIC KEYPAD:** facilitates rapid entry of numeric data. Fully programmable. Hand-held or free-standing **£60.25**

**LOGIC ANALYSER:** multiple functions include: test and repair, development of logic circuits, and education. 8 MHz 8 channel **£250**



All products complete with comprehensive documentation and 1 year guarantee. All prices excl. VAT inc. P&P

For further information contact: Gary Daltrey  
Softlife Limited 87 Silvertown Way  
London E16 4AH Tel: 01 474 0330

# PRINTERLAND

UK's LOWEST PRINTER PRICES

ORDERED TODAY  
DELIVERED TOMORROW

### NEAR LETTER QUALITY

EPSON LX80	£189.00	£217.35
EPSON FX85+	£360.00	£414.00
EPSON FX 105 +	£455.00	£523.25
EPSON LQ 800	£515.00	£592.25
EPSON LQ 1000	£646.00	£742.90
EPSON LQ 1500	£715.00	£822.25
EPSON DX100 - SPECIAL OFFER:	£356.00	£409.40
EPSON JX-80 - SPECIAL OFFER:	£450.00	£517.50

**FANTASTIC VALUE**

## CANON PW1080A

160 CPS DRAFT  
27 CPS N.L.Q.

**£209 + VAT**

QUENDATA £139 VAT

DAISY WHEEL PRINTER  
18 CPS QUME  
COMPATIBLE

PANASONIC KXP  
1080U

100 CPS/20 CPS N.L.Q.  
£159 + VAT

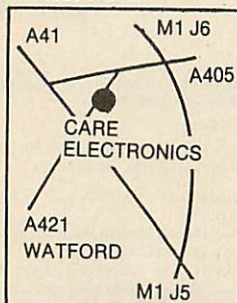
156 LONGWOOD GATE LONGWOOD HUDDERSFIELD  
TELEPHONE: 0484 646048/9

AA288

# CARE

OPEN  
9am-5pm MON-THU  
9am-4pm FRI-SAT

800 ST ALBANS ROAD,  
GARSTON, WATFORD,  
HERTS WD2 6NL  
Tel: 0923 672102



### NEW PRODUCT AVAILABLE

MASTER ROM CARTRIDGES  
USER PORT  
SWITCHER 621

### RGB CONVERSION

Philips/Pye & Ferguson TX  
Conversion Kit (D.I.Y.)  
Factory Conversion

@ £46.00d  
@ £69.00a

### READYMADE LEADS

Disc Drive Data (Dual) @£9.66c  
Disc Drive Power (Dual) @£4.60c  
Phono to BNC @£4.60c  
Phono to Phono @£2.99c  
Phono to UHF @£2.60c  
RGB 6-6 pin DIN @£2.99c  
RGB 6-7 pin DIN (Hitachi) @£4.14c  
RGB 6-7 pin DIN (Ferguson) @£4.14c  
RGB 6 pin to SCART (Euro) @£7.82c  
Many other types available please telephone or write for details.

### ROM EXPANSION

BBC Model B & B+

Low Profile System @£10.81d  
Spare Cartridge @£2.07c  
Zif Socket Cartridge @£8.05c  
Library Rack (Holds 6 Cart) @£1.84c

### BBC MASTER SERIES

Care Master ROM Extender @ £9.20c  
Will accept CARE or Viglen Cartridges  
Master 128k Micro @ £454.25  
Acorn Master ROM Cartridge @ £14.95c  
Care Master ROM Cartridge @ £10.81c  
Zif Socket Versions  
Care Master ROM Cartridge (1 Zif) @ £16.56c  
Care Master ROM Cartridge (2 Zif) @ £21.62c

### SWITCHING UNITS

Printer 2 to 1 (Inc Lead) @£34.50d  
Printer 6 to 1 @£80.20d  
Printer 2 to 2 'CPX2 Buff' @£46.00b  
User Port 2 way fully buffered & off posn (inc lead) @£37.95d  
User Port 6 way & off posn (inc lead) £80.20d  
RS423 2 to 1 @£23.00d  
RS232C 2 to 1 'T' @£59.80d  
RS232C 2 to 2 'X' @£69.00d



### DOT MATRIX PRINTERS

Kaga Taxan 810 with NLQ @£247.25a  
Kaga Taxan 910 with NLQ @£391.00a  
Printer Cable 1mt @£7.82c  
Printer Cable 1.5mt @£9.20c  
Ribbon Hi-Sec KP-R @£6.90c

### FLOPPY DISCS

3.5" (each) @£3.91c  
3.5" (per 10) @£33.10c  
5.25" S/S D/D (per 10) @£12.65c  
5.25" D/S D/D (per 10) @£13.80c

### OTHER PRODUCTS

Eprom 2764 250n/s 8K @£2.53c  
Eprom 27128 250n/s 16K @£3.45c  
Acorn DNFS Interface kit @£69.00c  
Wide range of Connectors  
Wide range of Semiconductors

### MONITORS

(Price inc lead)

Philips Monitors  
BM7502 Green Hi-Res @£89.70a  
BM7522 Amber Hi-Res @£92.00a  
CM8533 Colour Med-Res @£289.80a  
Hantarex Monitors  
HX-12 Green Hi-Res @£79.50a  
CT9000 Colour Med-Res @£199.50a

### TV/MONITORS

(Price inc lead)

Philips CF1114 14" @£197.80a  
Philips CT2016 16" @£276.00a  
Philips CT2216 16" Remote @£310.50a

### POWER SUPPLIES

For use with Disc Drives  
Single 1 x BBC Outlet @£27.60b  
Dual 2 x BBC or D/D Outlets @£28.75b  
For Use With most peripherals  
Quad 4 x BBC Outlets @£34.50b

### HOW TO ORDER: ALL PRICES INCLUSIVE OF VAT

By Post. Enclose your Cheque/P.O. made payable to CARE Electronics. Or use ACCESS/VISA. Allow 7 days for delivery. Please add carriage.

a = 9.99 b = 5.00 c = 1.00 d = 2.00





# GO BANANAS

Suitable for virtually ALL computers with 5¼" drives whether single or double sided. If a single sided drive, then you will be able to get twice the storage as you can flip these over.



**Only £8.65 exc VAT**  
(£9.95 inc VAT per ten-pack)

#### Specification:

- \* Double Sided Double Density 40 or 80 track
- \* Hub Reinforcing ring means TOTAL reliability
- \* Truly REVERSIBLE with 2 notches & Index holes
- \* TWICE the storage at HALF the cost!
- \* Perfectly suitable for Double Sided Disk Drives
- \* All our bananas are individually certified
- \* Made to our specifications by a major manufacturer
- \* Lifetime warranty on EVERY banana
- \* You can't afford to keep driving to your disk shop with prices like these. Just pick up the 'phone & we'll have them at your door in a trice!

If you don't need disks today, just keep this ad.

\* Grown exclusively by:

**DISKING**  
**FREEPOST**

Liphook  
Hants GU30 7BR

Tel: (0428) 722563 (24hr Order Hotline)

If coupon clipped - just call



**Post To: DISKING FREEPOST Liphook Hants GU30 7BR**  
Tel: (0428) 722563 (24hr order hotline)

Please rush me \_\_\_\_\_ boxes of bananas @ £9.95 per box plus P&P @ £1.09 per box. Total £11.04 per box inc VAT. P&P is 86p/box for 3/5 boxes, 69p/box for 6-9 boxes. Ten boxes or more are POST FREE.

**Official Government orders are welcome.**

**FREE 'Go Bananas' badge with every ten-pack**

**All orders despatched in 4 hours**

Name \_\_\_\_\_

Address \_\_\_\_\_

Tel No. \_\_\_\_\_

I enclose cheque payable to DISKING, or please debit my

ACCESS/VISA card No: \_\_\_\_\_



# TWILLSTAR COMPUTERS LTD

**THE BRAND NEW MASTER COMPACT  
JUST LAUNCHED BY ACORN COMPUTERS  
AN INVESTMENT FOR YOUR FUTURE**



**STOCKS AVAILABLE NOW**

Subject to demand

Call **01-571 5938** or **01-574 5271**

Please add £8.00 for postage and packing

Access and Visa card accepted

Or by cheque made payable to:

TWILLSTAR COMPUTERS LTD and sent to  
Apex House, Blandford Road, Norwood Green,  
Southall, Middx UB2 4HD

Showroom open 7 days a week

**SYSTEM 1: £458.85** INC. VAT

CPU ★ ROM software ★ Disk software  
Integral 3.5" drive ★ TV modulator

**SYSTEM 2: £539.35** INC. VAT

CPU ★ ROM software ★ Disk software  
Integral 3.5" drive ★ Monochrome monitor

**SYSTEM 3: £688.85** INC. VAT

CPU ★ ROM software ★ Disk software  
Integral 3.5" drive ★ COLOUR monitor

## SPECIFICATIONS:

★ Compatible with Master Series micro subset

128K RAM inc 64K sideways RAM ★

★ 64K ROM inc 32K MOS, 16K BASIC

Up to 4 internal ROM sockets ★

★ 3.5" 640K formatted disk drive

Outputs: Video\*RGB\*Printer\*Mouse or Joystick

Disk drive\*(optional) Econet\*Serial

★ 5V power from disk drive module

Usual 8 BBC display modes inc. Mode 7 ★

**BUNDLED SOFTWARE:** Pull down menus ★

Desk top inc. note pad, calculator ★ VIEW 3.0 ★

CARD INDEX ★ Full LOGO ★ BBC BASIC 4.0

★ ADFS + Utils ★ Welcome suite ★ Tutorials

★ (1770 DFS under licence) ★

## The first complete software development package

# PROPAK

Multi-window text editor, assembler, loader,  
monitor/debugger and EPROM programmer.

**PROEDIT** text editor Up to nine windows anywhere on screen  
Full screen editing

**PROASM** assembler Supports all 6502 Instructions Fast assembly  
Range of assembler directives Symbol table

**PROLOAD** object module loader Virtual & absolute loading  
Full display of load addresses

**PROMON** machine code monitor Trace feature  
Load and execute machine code programs Hunt facility

**PROREPROM** programmer Burns 16k, 32k, 64k and 128k EPROMs  
Fetch - to read, burn or dump any area of RAM/ROM (Incl sideways ROMs)

**THE MICRO USER** Review July '86 **Verdict:**

**"A STRIKING PIECE OF  
INTEGRATED SOFTWARE"**

Previously affordable only by  
Major Software Developers...

**NOW ONLY £65.95**

### OPTIONAL EXTRAS:

The PROPAK EPROM programmer £65

PROEDIT, PROASM & PROMON ON EPROM AT £5.00 EACH



**0206 579413 - TO ORDER**



SCICOM INTERNATIONAL, SUITE 4,  
COWDRAY CENTRE HOUSE, COLCHESTER, ESSEX CO1 1BH  
ADD 15% V.A.T. TO ALL PRICES. P & P INCLUDED.

# NEVIS



since 1970

**ALL DISCS TESTED INDIVIDUALLY  
100% GUARANTEED**

5 1/4" S/S DD	10'S	£9.00
D/S DD 96TPI	10'S	£9.50

**FREE LIBRARY BOX WITH 10'S  
V.A.T AND POST/PACK, INCLUDED.**

## BULK PURCHASE DISKS

	50	100	250
5 1/4" S/S DD	£27.50	£50.00	£120.00
D/S DD (96)	£32.50	£60.00	£145.00
3 1/2" S/S DD	10'S	£15.95	
D/S DD	10'S	£19.95	
3" D/S DD	10'S	£34.50	

**NEVIS RECORDS LTD.**

76, MUSWELL HILL ROAD  
LONDON N.10. 01-883 7656



AA183



# BUSINESS

NEWS

## Database price cut

Gemini has cut the price of its *Datagem* database package by £50 and is making it available on cartridge for the Master. The program has been re-written to make use of Acorn's and Solidisk's advanced disc filing systems.

The price was £129.95, now both Beeb and Master versions are available for £79.95. Upgrading to the Master package costs £25.

Complete details of the package are available from Gemini, Concorde Road, Exmouth, Devon EX8 4RS.

## Dual printers

Two printers can be connected to a micro with a new cable from Hardworks Ltd. With the T.Switch, daisywheel and dot matrix printers can be connected simultaneously or alternatively two printers with different paper. Printer selection is done via a switch.

The T.Switch costs £75. Details are available from Hardworks Ltd, 1 The Corner, Horsey, Great Yarmouth, Norfolk NR29 4EH.

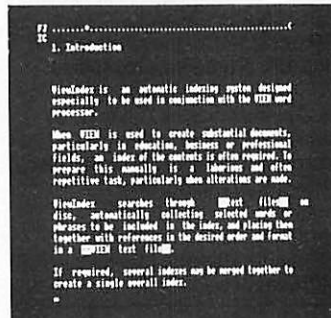
# New Master package

by Steve Mansfield

A single new package for the Master provides all *View* products plus enhanced features for linking the programs.

*Overview* contains *ViewStore*, *ViewSpell*, *ViewIndex* and *ViewPlot*, plus linking utilities which work with these titles and the *View* and *ViewSheet* programs already in the Master.

*ViewStore* is Acorn's database program. *ViewSpell* is a spelling checker for *View*, while *ViewIndex* is used to produce page indexes from wordprocessed text. *ViewPlot* is a plotting program which produces graphs from sets of figures, including those produced with the *ViewSheet* spreadsheet. It has all been crammed into a cartridge containing two 16k ROMs.



View Index: a feature of Overview

The most important of the utilities is a routine which automatically saves the working file onto sideways RAM when switching to an alternative program.

If in *View*, for example, switch to the *ViewSheet* spreadsheet and the *View* text is then saved in SRAM. When returning to *View*, the text is automatically loaded back in.

If sideways RAM becomes too full, the system will switch to disc for saving the file. This feature is easily switched on and off using a star command.

Acornsoft has also followed Computer Concepts by cramming more characters on the screen. Typing \*WIDE gives 105 characters per line in mode 0 and 53 in mode 4.

Acornsoft briefly looked at providing the package for BBC B micros, but decided that the special ROM chips necessary would make it too expensive. As it is, the Master package is expected to retail at just under £100.

More details can be obtained from Acornsoft at Cambridge Technopark, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.

# Interbase delayed again

Computer Concepts' database package, *InterBase*, has been delayed again, but the chip-based spelling checker should be with us soon.

*InterBase* is to be a programming language rather than a

straightforward database.

*InterBase* utilises a completely new 28k language, the format of which is close to Basic.

Computer Concepts said that the software is slightly over 32k. The company could cut the pro-

gram down to fit a 32k chip, but is more likely to add features and go for a 64k ROM.

The spelling checker ROM will be Computer Concepts' next release for the Beeb, and is now expected in October. The prototype is currently running at about 11,000 words a minute, and it will check text when entered.

While 128k ROM chips remain expensive and scarce, Computer Concepts will sell the spelling checker as two ROMs on a carrier board. The chips will still appear as one chip to the computer. The price is £69.

Computer Concepts can be contacted at Gaddesden Place, Hemel Hempstead, Herts HP2 6EX.

## BUSINESS TOP FIVE

Title	Publisher	Cassette	Disc	ROM	Electron	B+	Master	6502	Econet
1 Mini Office 2	Database	£14.95	£16.95	-	-	Yes	-	No	-
2 Database	Gemini	£19.95	£23.95	-	-	Yes	Yes	-	-
3 Desk Diary	Acornsoft	£6.99	-	-	Yes	-	-	-	-
4 Wordwise Plus	Computer Concepts	-	-	£56.35	-	Yes	Yes	Yes	Yes
5 View 3	Acornsoft	-	-	£89.70	-	Yes	Yes	Yes	Yes

Compiled by Gallup/MicroScope. Contact publishers: Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Tel: 061-429 8080. Gemini, Gemini House, Dinan Way, Exmouth EX8 4RS. Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933. Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.



# INFORMATION PROCESSING ON YOUR BBC COMPUTER!

WHY SHOULD THE BIG BOYS GET ALL THE INTEGRATED SOFTWARE?

For serious users of the BBC computer. Disc machines only.

What the reviewers say:-

**DATASCRIBE IS BRILLIANT VALUE FOR MONEY —**

John Vogler, A & B Computing, Sept 1985.

**I SHALL USE SCRIBE FOR MOST OF MY WRITING —**

John Dawson, Your Computer, Feb 1985.



## SCRIBE £39.95

THE PROFESSIONAL WORD PROCESSOR designed for the serious user  
\* All operations fully prompted \* No special knowledge of the computer system necessary \* Document size NOT limited by computer memory \* Automatic disc buffering ensures text is moved between disc and computer memory without user

intervention \* Up to 255 pages in a single document \* 80 column display \* On screen underline and right justify \* See it as it will be printed. SCRIBE comes in a chip with 5 minute fitting instructions, utilities disc and manual. Integrates with Database.



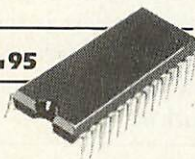
## DATABASE £49.95

A superb record keeping system with an incredible operating speed. 96 fields per record \* One record 2 Kb max \* One field 900 characters max \* 4000 records per database \* 16 level conditional search \* Record match \* 8 automatic sub indexes \* Total flexibility of output via report writer with ability to write back to the database \* Maths

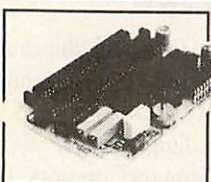
pack \* Semi programming language plus compiler. Integrates with Scribe to give conditional search with MAIL MERGE and high powered report formatting. Comes in ROM.

## DATASCRIBE £69.95

Scribe & Database in a single chip! Contains all the features of both products and with an attractive saving on price and ROM space.



## DOUBLE-DOS £45



Double density disc interface. A high capacity database or word processor is enhanced even further with this state of the art disc interface. The many features include \* 720 Kb of CONTINUOUS file space on a standard 80 track disc drive \* Automatically read standard Acorn files \* Compensate for discs formatted in single density \* Provide up to

159 files IN ONE DIRECTORY \* Automatically read, write and format double sided drives to appear as one disc surface \* Allow maximum use of MERTEC Scribe and Database. Very easy fitting — no soldering — full instructions provided.

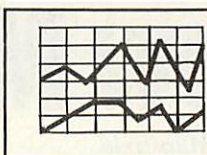
## SCRIBECHEC £24.95

### TYPING/SPELLING CHECKER.

The fastest typing checker available. \* 7200 word base dictionary in ROM plus room for your own 15,000 (approx) word dictionary on disc \* Any number of dictionaries \* Maintenance includes add and delete, list words between alpha limits and many more features \* Check speed 1500 words per minute! \* Any document length. Also available for wordwise & view.



## DATASTAG £49.95



### STATISTICS AND GRAPHICS PACKAGE. (ROM BASED)

Coming soon. A highly professional system which integrates with Database. Allows you to store your data in any format and, using Database, present all or selected items of data for graphing and statistical analysis \*

Graphs include Pie, bar, histograms, line plot, scatter plot \* Display between one and four graphs simultaneously \* Automatic scaling and direct digital readout of graph co-ordinates \* Statistics include all standard tests plus linear regression and correlation etc \* seven non-parametric tests \* Epson screen dump included with facility to add your own printer dump.

## MINI ROM BOARD £14.95

Provides four extra ROM sockets. Easy fitting and without any of the overheating and space problems associated with large expansion boards. **FOR BBC MODEL B ONLY**

**\*SPECIAL COMBINED PACKAGE OFFER\***

Datastag & Database (in one chip) ☐ £69.95

## NEW MERTEC TITAN CHIP FOR THE BBC MASTER 128

### Six integrated packages with one chip! £95

WORD PROCESSOR DATABASE STATISTICS  
GRAPHICS SPELLING SPELLING  
CHECKER FOR VIEW CHECKER  
FOR SCRIBE

TITAN USES THE ADFS AND REQUIRES A DUAL DISC DRIVE.  
BBC MASTER NETWORKING ENQUIRIES WELCOME

Prices include VAT. Add 60p post and packing to your order. Discounts on Dealer and education application



### MERTEC COMPUTER PRODUCTS

Please supply the following products/information. Please tick box.

SCRIBE <input type="checkbox"/>	QTY _____	£ _____
DATABASE <input type="checkbox"/>	QTY _____	£ _____
DATASCRIBE <input type="checkbox"/>	QTY _____	£ _____
DOUBLE DOS <input type="checkbox"/>	QTY _____	£ _____
SCRIBECHEC <input type="checkbox"/>	QTY _____	£ _____
DATASTAG <input type="checkbox"/>	QTY _____	£ _____
TITAN <input type="checkbox"/>	QTY _____	£ _____
MINI ROM BOARD <input type="checkbox"/>	QTY _____	£ _____

TOTAL \_\_\_\_\_

I enclose £ \_\_\_\_\_ Inc P&P \_\_\_\_\_

My credit card No. is \_\_\_\_\_

Visa ☐ Access ☐ Tick which \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

To MERTEC COMPUTER PRODUCTS

33/36 Singleton Street, Swansea SA1 3QN. Tel: 0792 467980

**IMPORTANT NOTE:** Please check with us if you decide to use any other disc interface than Acorn or Double-Dos with Scribe or Database.



### Introducing Fred

An intelligent communications package, aimed at electronic mail users, has been launched by Aldoda International. The software, called *D*, is effectively a communications language.

Three versions are available, all on disc. The standard *D* software costs £25. There is a viewdata version, *D7*, at the same price, both together retail at £37.50.

The company has also released a viewdata frame editor by the name of *Fred*. As well as advanced teletext editing facilities, the program also features a sophisticated text editor.

The price of *Fred* starts at £43. For details contact Aldoda on 01-794 0991.

## New System Delta range

Minerva has added to its range of application software programs based on the *System Delta* database generator.

The programs are aimed at video library owners, hoteliers, estate agents and school administrators. A newsagent package is near completion.

*Video Rental* tracks up to 5000 customers and indicates who has what, overdue items and a top ten. The program costs £54.95. *Hotelier* at £59.95, handles bookings, receipts and matching rooms to clients's needs. *Estate Agent* similarly matches houses to clients's needs and the schools' package can be used to produce detailed class and examination

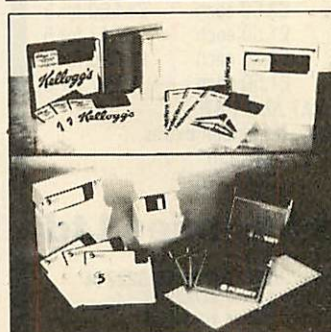
lists. Each will retail with a price tag of £69.96.

Other businesses are catered for with the introduction of three general business programs; an order processing and invoicing package at £45.95, a sales ledger for the same price plus a mailshot application for £19.95.

All the programs require the *System Delta* ROM to be present. This retails at £64.95.

Minerva has also published a detailed *Reference Guide* aimed at people wishing to develop applications.

Minerva can be contacted on (0392) 37756.



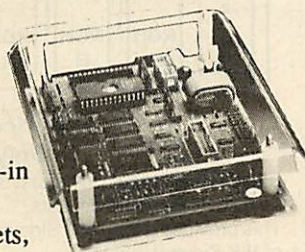
### Designer discs

Now floppy discs can have your company logo on their labels and sleeves, through a personalised disc service from RPS. RPS has had a good response to the service, including orders from Kellogg's, which sees it as a security measure. Contact RPS on (0582) 867222.

## SCORPION controller

Only a danger to the unwary

The Scorpion is a new type of control system. It combines the powers of a micro-processor, a 32K language and 36 interface ports in a small self-contained unit. It connects to your computer using the serial interface and can be programmed to perform many control and data logging tasks using its own built-in language. The battery backed memory means that it never forgets, and will continue running even when disconnected from your computer. Scorpion allows you to solve control problems fast, ignore it at your peril.



#### Features

- 24K Ram, 32K system Rom
- Multi-tasking procedural language
- Battery backed memory
- Clock/calendar
- 240V AC or 12V DC supply
- Works with ALL BBC computers
- Also with IBMs and Nimbus etc

#### Addons

EV1 vision system, Beasty robot arm, sensors, servos, LCD display, keypad and 8 channel relay driver

#### On board interfacing

- 8 Analogue inputs
- 4 Digital outputs
- Alphanumeric LCD
- 20 key keypad
- 2 Shaft encoders inputs
- 16 Beasty servo outputs
- Serial interface
- User port
- I<sup>2</sup>C port to 64 digital and 32 analogue IO lines

£249.00 +vat

Access orders welcome

### MICRO-ROBOTICS LTD

264 Newmarket Road, Cambridge CB5 8JR Tel: (0223) 323100

## context

### computing

#### BANK MANAGER for disc systems only

The most advanced and versatile personal bank account management program available for all BBC computers. Consistently acclaimed!

"data entry is a delight... professional... excellent product" Micro User April 86

Enter cheques and receipts. Standing orders any frequency. Automatic date sequencing. Reconcile statements. Search, amend and delete. Unreconcile. Move forwards or backwards. Analyse expenditure. Forward cash flow forecast. Up to 36 simultaneous 'bank' (bank, credit cards, savings, cash) accounts online simultaneously, inter-account transfers, 9999 standing orders, 99 analysis categories, 12 actual and 12 budgets per category, over 4,000 postings on an 80k disc. Reports to screen or printer. Graphics. Foreign currency support. Password. File recovery. Auto exec file. Field editing. Itemised look ahead. Programmable report writer.

Standard Bank Manager for the BBC B, B+ £17.50

#### BANK MANAGER MASTER for disc systems only

Version 2 now available. Includes all of the facilities of the Standard Bank Manager plus ADFS file system support, shadow screens, uses sideways RAM, 40 or 80 column screen reports, improved graphics, m/c windows, function key support and onscreen labels, additional functions added to the already extensive report facilities.

Bank Manager Master for the MASTER and MASTER COMPACT £22.50

Upgrade from standard, return original disc and £6.00

#### BANK MANAGER BUSINESS UTILITIES for disc systems only

For the 'professional' who also use the BANK MANAGER to control the business accounts the BUSINESS UTILITIES add double entry trial balance and programmable spreadsheet analysis reports. Generated from cheque and cash transactions keyed into BANK MANAGER. Just pass the reports to your accountant! Use with either standard or master/compact version.

Bank Manager Business Utility Pack 1 £12.00

#### TYPING TUTOR

Quickly learn to touch type. Over 90 smoothly graded lessons graduate you from the basic home keys to complete keyboard mastery. Unique word scan line checking. Target WPM and percentage correct. You may revise the targets or lessons as required. Audio key click for positive key depression. Establish a typing rhythm using the automatic metronome. Free format option. Recommended.

for BBC B, B+, Master and Compact; Cassette £9.50, Disc £12.50

ALL PRICES FULLY INCLUSIVE. FREE POSTAGE WITHIN UK.  
Enquiries and Access Credit card orders telephone 023 03 347

CONTEXT COMPUTING 15 Woodlands Close, Cople, Bedford MK44 3UE

Please rush me ..... on cassette/disc:- ☐ 40k ☐ 80k ☐ 3.5" ☐ DFS ☐ ADFS

I have a BBC: ☐ B ☐ B+ ☐ Master ☐ Compact.

Enclosed £ ..... or debit my Access card no. ....

Name .....

Address .....

FAST DELIVERY



## AT LAST WHOLESALE PRICES TO YOU THE USER

Below is only a sample of our products and prices please phone or write for your computer requirements.

### 5 1/4" Floppy Disks - with Lifetime warranty & certified 100%

SS/DD 48tpi	£7.25 per 10	} Price includes FREE Library case
DS/DD 48tpi	£9.00 per 10	
DS/DD 96tpi	£9.95 per 10	

With orders of 50, 70 or 100 discs a FREE lockable disc box instead of library cases. Your option.

### 5 1/4" Lockable Disc Boxes

DD-100L	100 Capacity	£11.00
DD- 70L	70 Capacity	£9.50
DD- 50L	50 Capacity	£8.50

### 3 1/4" Lockable Disk Box

DD- 40L	40 Capacity	£8.50
---------	-------------	-------

### Computer Cleaning Products

De-Lux 5 1/4" Kit (Attache cased)	£16.99
Boxed 5 1/4" Kit	£12.99
5 1/4" Head Cleaner including fluid	£4.34
Screen Cleaner Anti-static	£4.80

### Printer Ribbons (Vast range available)

Epson MX/FX/RX 80	£3.25 each	£14.40 for 5
Shinwa CP80/MT 80 M/S	£3.50 each	£14.60 for 5
OKI 80/82/83	£1.50 each	£7.17 for 5
Juki 6100 M/S	£2.30 each	£10.25 for 5
Star 10X-15X	£1.50 each	£7.17 for 5

### ALL PRICES INCLUDE VAT AND P&P

The price you see is what you pay. No hidden extras.

Please make cheque & PO payable to:



## Manor Court Supplies Ltd

80 North Road, Yate, Bristol, Avon BS17 5PR. Tel: 0454 322744

VAT invoice if required Co. Reg. No. 1730374

Trade, Government and educational orders accepted.

AA232

## BBC/ELECTRON EDUCATIONAL SOFTWARE

Our educational software is used in thousands of schools and homes throughout Great Britain.

### EDUCATIONAL 1

BBC/ELECTRON

£6.95 £8.95  
Tape £8.00 Disc £10.00

Hours of fun and learning for children aged five to nine years. Animated graphics will encourage children to enjoy counting, maths, spelling and telling the time. The tape includes six programs: MATH 1, MATH 2, CUBECOUNT, SHAPES, SPELL and CLOCK.

... 'An excellent mixture of games' ... Personal Software - Autumn 1983.

### EDUCATIONAL 2

BBC/ELECTRON

£6.95 £8.95  
Tape £8.00 Disc £10.00

Although similar to Educational 1 this tape is more advanced and aimed at seven to twelve year olds. The tape includes MATH 1, MATH 2, AREA, MEMORY, CUBECOUNT and SPELL.

### FUN WITH NUMBERS

BBC/ELECTRON

£6.95 £8.95  
Tape £8.00 Disc £10.00

These programs will teach and test basic counting, addition and subtraction skills for four to seven year olds. The tape includes COUNTING, ADDING, SUBTRACTION and an arcade type game called ROCKET MATHS which will exercise addition and subtraction. With sound and visual effects.

... 'These are excellent programs which teachers on the project have no hesitation in recommending to other teachers.' ... Computers in the Classroom Project, Riley High School.

### FUN WITH WORDS

BBC/ELECTRON

£6.95 £8.95  
Tape £8.00 Disc £10.00

Start your fun with alphabet puzzle, continue your play with VOWELS, learn the difference between THERE and THEIR, have games with SUFFIXES and reward yourself with a game of HANGMAN.

... 'Very good indeed' ... A&B Computing - Jan/Feb 1984

### JIGSAW AND SLIDING PUZZLES

BBC/ELECTRON

£6.95 £8.95  
Tape £8.00 Disc £10.00

There are two jigsaw and four sliding puzzles on a 3 x 3 and 4 x 4 grid. Each program starts off at an easy level to ensure initial success but gradually becomes harder. It helps children to develop spatial imagination and in solving problems. The tape includes: OBLONG, JIGSAW, HOUSE, NUMBERS, CLOWN and LETTERS.

### KON-TIKI

BBC

£11.95  
Disc £12.95

Simulation program based on Thor Heyerdahl's KON-TIKI expedition. Enjoy a journey on the KON-TIKI recording on a map the raft's position and entering notes in the logbook on creatures found, unusual events etc. Inclusive of booklet, background information, maps and fully supportive illustrated data sheets.

... 'A well thought-out package with a wide appeal' ... Which Micro & Software Review - October 1984.

### ★SPECIAL OFFER★

Buy three titles and deduct £4.00

Add 50p p&p per order. Please state BBC or ELECTRON or 40 or 80 track for discs.

Golem Ltd, Dept A, 77 Qualitas, Bracknell, Berks RG12 4QG. Tel: 0344 50720

## Direct Mail Discount

**1.50**

VISION APPLE PIE  
ASP BISHARCK  
VIRGIN BUG BOMB  
VISION DAREDEVIL DENNIS  
VISION DIGGER  
ASP FROGLET  
QUICK GENERATORS  
GRIFF GET SET  
FIREBDD MICROCOSH  
FIREBDD MR BREEZE  
ODHOUSEMR. T MEETS HIS MATCH  
ODHOUSEMR. T MEASURING GAMES  
ODHOUSEMR. T MONEY BOX  
VIRGIN NOC-A-BLOCK  
GRIFF NUMBER FUN  
GRIFF TABLE SUMS  
VISION WORLD OF DOOM  
MPOWER FELIX IN THE FACTORY

**2.50**

GRUFF ATOMS AND MOLES  
GRUFF DOLL AND DRUM  
GRUFF ENGLISH SKILLS II  
GRUFF MATHSKILL II  
GRUFF MENTAL ARITHMETIC  
HRM NIGHTMARE MAZE  
GRUFF ODD ONE OUT  
GRUFF WORDGAMES

**2.95**

SALAMA 737 SIMULATOR  
INCEPT ARABIAN NIGHTS  
LONGHORN FIRST MOVES (CHESS)  
YES GOLF  
HEWSON HEATHROW ATC  
OCEAN HATCH DAY  
MICUSAR MICRO OLYMPICS  
ACORN TELVA POD  
PANDA UNDERSTAND YOUR MICRO

**3.50**

MRM ARTIST  
ACORN BIOLOGY  
A'N'F CHUCKLE EGG  
ACORN CRIME & DETECTION (2 TAPES)  
GEMINI DATABASE  
ACORN DATING GAME (2 TAPES)  
ACORN ENGLISH  
GRIFF FAIR SHARE  
ADVENT GREMLINS  
ACORN HISTORY QUIZ (2 TAPES)  
ACORN I DO (2 TAPES)  
ACORN MISSING SIGNS  
ACORN MUSIC QUIZ (2 TAPES)  
ACORN ROYAL QUIZ (2 TAPES)  
ACORN SCIENCE QUIZ (2 TAPES)  
ACORN THEATRE QUIZ (2 TAPES)

**4.95**

ULTIM ALIEN 8  
ACORN POLE POSITION  
ATARI ROBOTRON

**6.95**

ADDICT FOOTBALL MANAGER

**7.90**

SALAM GRAPHICS  
LOGIC 3LEARN BASIC

**1.50**

VISION APPLE PIE  
ASP BISHARCK  
VIRGIN BUG BOMB  
VISION DAREDEVIL DENNIS  
VISION DIGGER  
ASP FROGLET  
QUICK GENERATORS  
GRIFF GET SET  
FIREBDD MICROCOSH  
FIREBDD MR BREEZE  
ODHOUSEMR. T MEETS HIS MATCH  
ODHOUSEMR. T MEASURING GAMES  
ODHOUSEMR. T MONEY BOX  
VIRGIN NOC-A-BLOCK  
GRIFF NUMBER FUN  
GRIFF TABLE SUMS  
VISION WORLD OF DOOM  
MPOWER FELIX IN THE FACTORY

**1.99**

IMAGIN B.C. BILL  
LOTH BATTLEZONE 2000  
SUPER BMX ON THE MOON  
CBS CASTLE BLACKSTAR  
MICRO CHESS  
ICON CHRYSALIS  
CCS CORN CROPPER  
IMAGIN COSMIC CRUISER  
MICTRS CROSSWORD PUZZLER  
MPOWER CYBERTRON MISSION  
VISION DEHOLATOR  
FIREBDD DUCK  
PAXMAN EMPIRE  
SILVER FRENCH ON THE RUN  
MICRO FRENZY  
VISION GALAXY RAIDERS  
HARTEK GIBBURN'S CASTLE  
ULTIM JET PAC  
CCS MANAGE  
MPOWER MOONRAIDER  
SUPER HR VIZ  
SUPER OVERDRIVE  
VISION PENGU  
VIRGIN PLACK WALK  
CCS PLUNDER  
QUICK PROTECTOR

**We've lots more for....**

**BBC \* ELECTRON**

**VOLTMACE BBC JOYSTICKS**

SINGLE RRP £12.00  
OUR PRICE 9-95 + £1 for P/P

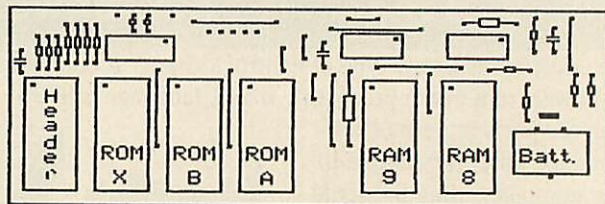
PAIR RRP £19.95  
OUR PRICE 16-95 + £1 for P/P

5.99 + 40p P/P

Please add 20p/title for p&p

## CYGNET ELECTRONICS

### RAMWISE II



### 32K RAM-ROM Board

Only £38.95 inc.

Expand the capacity of your BBC micro to 32K of Sideways RAM. Plus TWO EXTRA ROM sockets.

This provides a total of 8 Sideways ROMs, 6 ROM sockets + 2 banks of 16K Sideways RAM.

- \* Battery backup fitted
- \* Write protect switch included
- \* No soldering required
- \* FREE utilities disc to save and load ROMS
- \* \*LOAD capability
- \* RUNS all existing ROMS

### RAMWISE 16K RAM Module

STILL AVAILABLE AT A NEW LOW PRICE OF  
£21.50 inc.

- \* Small module plugs directly into any spare ROM socket
- \* Write protect switch included
- \* Runs all existing ROMs
- \* Already used in schools on ECONET and E-NET systems
- \* ATPL ROM board compatible

APPLY FOR QUANTITY DISCOUNTS

Post to: **Cygnat Electronics, PO Box 27**  
**Bordon, Hants. GU35 0HH**  
Tel: (04203) 5229

AA271





## SPELL IT OUT

**ViewSpell drastically cuts the time spent checking processed text**

***Rob Macmillan***

Acornsoft's recently launched package, *ViewSpell*, boasts several useful features not found in many other spelling checkers, neither those for the BBC micro nor for other, more expensive, personal computers.

Features include a constant time for checking texts of any size, powerful single or multiple word look-up in the 77,709-word master dictionary or user dictionaries, and a compression of the master dictionary into just

178,534 bytes. I'll investigate the techniques used to achieve this power.

*ViewSpell* defines a word as being any collection of letters, decimal digits, apostrophes (') and hyphens (-), with the two restrictions that the first character must be a letter and the word may not be more than 32 characters long. It does not distinguish between upper and lower case letters. Letters are stored in upper case but printed out in lower case.

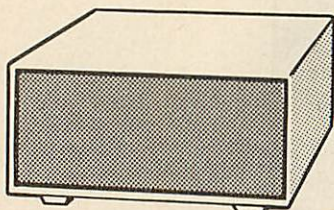
At first sight the most exciting feature of *ViewSpell* is the 77,709 word master dictionary. This is squeezed into 178,534 bytes – an average of less than 2.3 bytes per word. This compares with an average word length in the dictionary of over 8 letters and the usual computer representation of one byte per letter. So how is this compression achieved?

Each word is divided into three sections and each section is compressed in its own way. The



# NEW WINCHESTER DRIVES FROM MIDWICH

The experience gained in two years of supplying Winchester drives for the BBC Micro has established MIDWICH as the only manufacturer capable of supplying Hard Drives fully compatible with Acorn ADFS and Torch Z80 filing systems.



**THE  
MAGNUM**

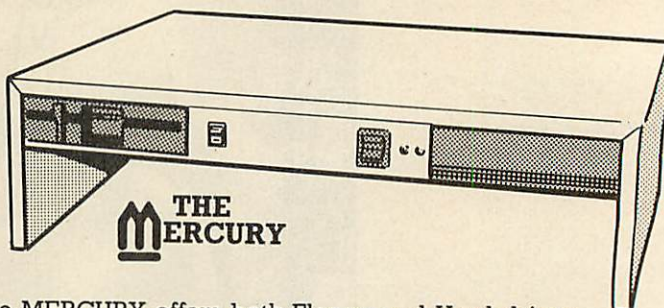
The smallest Winchester currently available for the BBC Micro yet still having a capacity of 20 megabytes, the MAGNUM occupies a volume no larger than a standard single floppy drive.

Both the MAGNUM and the MERCURY feature:

- Full compatibility with:
  - BBC Master Series, Acorn ADFS
  - Torch Z80, MWFS

Please specify interface required.

- Full 12 months part and labour warranty
- Low Cost – High Performance
- 5MHz Disc Data transfer
- Supplied with:
  - User Guide, Utilities disc, Cables



**THE  
MERCURY**

The MERCURY offers both Floppy and Hard drives conveniently housed in a Monitor Stand enabling you to contain your entire system in one neat package.

*Interested in the latest mass storage facilities available?  
Then why not contact us today*



**MIDWICH  
THAME  
LTD.**

GILRAY ROAD, DISS  
NORFOLK, IP22 3EU

A member of the Memec (Memory and Electronic Components) PLC Group

**TELEPHONE:**  
**0379 4131**  
**RING US TODAY!**

## MASTERCOPY

...the selective copier you need for the BBC MASTER computer...

Dramatically reduces the time taken to copy unprotected discs,  
**DFS to ADFS, ADFS to DFS, DFS to DFS, ADFS to ADFS**  
using one or two, single- or double-sided drives.

An 84K RAM buffer enables many files to be copied in one pass with the minimum of disc swapping, and directories are created automatically as required. Files of any length are handled.

Supplied on disc, MASTERCOPY runs from sideways RAM and is invoked with a \* command. The program re-installs itself in sideways RAM when copying is done, ready for later use.

The ROM image supplied can be used to blow your own EPROM too, for use in the MASTER's cartridge slots.

Typical time to copy all 31 files DFS to ADFS is under 2 minutes!

**£12.95 on disc – £14.95 for ROM version (including postage etc.)**

### For the Model B and Master:

**DESIGN 7** – the best Mode 7 designer on the market. Design any screen quickly and easily, from simple menus up to full viewdata-standard screens. Saves screens as automatically-numbered files (for screen dumps etc.), or will convert them to BASIC for use in your own programs. Hundreds in use. Only £8.95 incl. p&p.

**DESFAK** – a teletext emulator – now you can run your own videotex system with pages you design yourself. Up to 200 pages stored on an 80b track disc, or 100 on a 40 track. Incorporates a powerful carousel facility with animation effects. Built-in graphics dump. Beats all of the other 'FAX' systems for ease of use and versatility. Supplied on 2 discs. £24.00 incl. p&p.

Please indicate whether 40 or 80 track discs are required.

ECONET versions of DESIGN 7 and DESFAK are available.

For further details of these products please ring 091-263 4026

Enquiries, cheques or P.O.s to

**M/B Software**

4 Arden Close, Hadrian Park, Wallsend, Tyne & Wear  
NE28 9YB

AA278

## A New Concept in Software

Letters, Notes, Reports,  
Articles, Books, ...  
Ease creative writing with

**BBC**

**SCRATCHPAD**

**BBC**

The ideas organiser  
for creative writers

Organise your thoughts and make the ideas flow

- \* A suite of programs based on scientific knowledge about our thought processes
- \* Written by an established author
- \* Icon driven
- \* Fully tube compatible
- \* Spool to your word processor files
- \* Completely user-friendly
- \* Single or double disk drives

SCRATCHPAD makes writing so much easier – all you have to do is add the words. "Certainly a clever idea ... beats my sheets of A4" (Mirco User, Jan '86). "Well organised utility ... valuable to writers ... very useful indeed"

(Acorn User, June '86)

Price £24.95 (incl p&p)

INNOVATIVE SOFTWARE (AU)

41 Walter Road, Swansea

AA231

**FREE  
RACING  
ANALYSER**

**POOLS  
PREDICTOR**

**17,000  
MATCH  
DATABASE**

If you've ever asked yourself (and who hasn't!) how your computer can help you on your way to a pools fortune, here's some good news. The Mayday Software Pools Predictor. It's the expert system that's powerful and sophisticated yet easy to use. It comes with a massive database and, just as important, a track record of four highly successful seasons to back it up. So you can be confident you have your personal expert tipster taking the chance out of filling in your coupon. And completing this super punters' package, a free Racing Analyser program that will give you the low down on any horse race – without fuss!

1986/87 version now available for BBC, Electron and Spectrum (please state your computer when ordering).

AA283

**MAYDAY  
SOFTWARE**

181 Portland Crescent  
Stanmore, Middx. HA7 1LR

**£11.99**



LESSNESS	91	ICALS	129	AGES	167	IST	204
FULNESS	92	ITIES	130	ENCE	168	ISE	205
ABILITY	93	IFIED	131	ANTS	169	IZE	206
IBILITY	94	ISHES	132	SOME	170	ATE	207
LESSLY	95	SHIPS	133	STER	171	AGE	208
IOUSLY	96	ATING	134	ATED	172	ENT	209
ISHING	97	URING	135	ATED	173	ARY	210
ICALLY	98	ENESS	136	INGS	173	EES	211
ATIONS	99	EMENT	137	YING	174	ERY	212
SOMELY	100	ERERS	138	AGED	175	ANS	213
NESSES	101	AGING	139	ENTS	176	ESE	214
IONING	102	HOOD	140	IALS	177	IFY	215
IETIES	103	ANCE	141	URAL	178	ESS	216
ANCES	104	LIKE	142	URES	179	IAL	217
ISABLE	105	ABLE	143	URED	180	IVE	218
IZABLE	106	SHIP	144	ATES	181	OUS	219
EABLE	107	LESS	145	IVES	182	URE	220
INESS	108	NESS	146	ERER	183	ELY	221
MENTS	109	ERED	147	IETY	184	ALS	222
INGLY	110	MENT	148	ING	185	ICS	223
FULLY	111	IEST	149	IED	186	ED	224
ISHED	112	ABLY	150	ISH	187	IC	225
STERS	113	IBLY	151	UAL	188	AL	226
ERING	114	IBLE	152	FUL	189	EN	227
ISING	115	EDLY	153	DOM	190	ER	228
IZING	116	ALLY	154	ISM	191	OR	229
ATION	117	IOUS	155	IAN	192	ES	230
ATORS	118	ICAL	156	MAN	193	LY	231
ATELY	119	FULS	157	MEN	194	AN	232
ENCES	120	IERS	158	ION	195	EE	233
ENTLY	121	IONS	159	IER	196	RY	234
ERIES	122	ISES	160	IES	197	CY	235
ESSES	123	IZES	161	EST	198	E	236
IALY	124	ISTS	162	ILY	199	S	237
IVELY	125	IANS	163	ITY	200	Y	238
OUSLY	126	ISED	164	ERS	201	*	239
IFIES	127	IZED	165	ORS	202		
ANTLY	128	ATOR	166	ANT	203		

**Table 1: A list of the most common endings in English with their associated tokens**

three sections are: the initial letter; the 'root'; and the ending.

To serve as an example we will compress the following list of words:

compete  
competes  
competing  
competitor  
competitors  
compute  
computes  
computing  
computer  
computers  
computerise  
computerises  
computerising

and for simplicity we shall assume that they are the only words in the dictionary beginning with the letter 'c'.

The first letter of the word is coded very simply. It is thrown away. The dictionary is ordered alphabetically by initial letter and root (but not by ending) so all words beginning with 'a' come first followed by words beginning with 'b' and so on. *ViewSpell* keeps

an index containing one entry of where in the list each of the 26 letter sections begins. So the initial letters do not need to be stored with each word and 75,000 initial letters are compressed into an index of about 100 bytes.

The index of initial letter positions is also used when searching for individual words. Instead of searching through the whole dictionary for the word 'zoo' *ViewSpell* just starts at the beginning of the 'z' section. This technique could be enhanced by building an index containing entries for the second letter in each word as well. This would speed up searching but would not enhance the root compression, which I'll consider a little later.

## Common endings

From the beginning of each word we turn our attention to each word ending. There are many common endings in the English language and we use this fact to achieve the biggest compaction. *ViewSpell* knows about 160 common endings and each ending is encoded into just one byte. A file on the *ViewSpell* disc contains a list of the program expansions and this is loaded into the computer the first time

*ViewSpell* performs a load or a search. The encoding is done by reserving ASCII codes 91 to 255 as endings. Remember words consist of capital letters, decimal digits, apostrophes (') and hyphens (-) and these characters are all in the range ASCII 32 to 90. You will see later how the codes ASCII 1 to 31 are used for further compaction.

*ViewSpell*'s standard endings vary in length, up to eight characters. It strips from each word the longest ending that matches. This leaves the 'root' of the word and in the dictionary the roots are sorted into alphabetical order and followed by their lists of endings. Consequently when the dictionary is fully expanded it is not quite in alphabetical order since the endings are not ordered alphabetically.

Our word list now looks like this:

ompet/e/es/ing  
ompetit/or/ors  
omput/e/es/er/ers/ing  
omputer/ise/is/ises/ising

Suppose the codes for standard endings were as follows:

e	&80
es	&81
ing	&82
or	&83
ors	&84
er	&85
ers	&86
ise	&87
ises	&88
ising	&89

Then the word list translates into:

ompet &80 &81 &82  
ompetit &83 &84  
omput &80 &81 &85 &86 &82  
omputer &87 &88 &89

This has reduced our thirteen words totalling 122 letters into 37 bytes. We still have a little way to go.

Since the roots are sorted into alphabetical order in the dictionary, consecutive roots typically have letters in common. In our example every root starts with 'omp'. We use this knowledge to squeeze the last bytes from our word list as follows.

The first root is 'ompet' and this is left as the five letters 'o', 'm', 'p', 'e', 't' in the dictionary. The second root 'ompetit' has its first five letters in common with the previous root. We simply replace the first five letters with the ASCII code 5 to denote five in common and add in the two new characters 'i', 't'. The next root 'omput' has three letters in common with the previous root and so this is encoded 3, 'u', 't'. Similarly 'omputer' is encoded 5, 'e', 'r'. So the final encoding becomes:



MIDWICH ARE PROUD TO ANNOUNCE

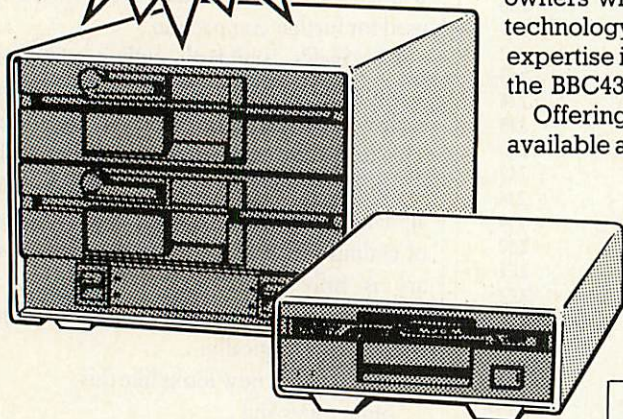
**NEW  
3 1/2" FLOPPY  
DRIVE  
FOR BBC  
MICRO**

## A BABY BROTHER FOR THE 5 1/4" DISC DRIVE

Since 1983 MIDWICH have supplied thousands of satisfied BBC Micro owners with a variety of 5 1/4" Floppy Disc Drives. Today's state-of-the-art technology drive mechanisms combined with MIDWICH's proven expertise in Disc Drive manufacture has culminated in our introduction of the BBC435 series of 3 1/2" boxed disc drives.

Offering all the advantages of 3 1/2" technology the BBC435 series are available as single or dual drives, with or without integral power supplies.

Fully compatible with all models of BBC Micro's the new baby of our family offers high performance with a minimum of power consumption. The Drives are 80 track double sided and can work in both double and single density operation giving up to 640K memory from a single drive.



### SPECIAL INTRODUCTORY OFFER

BBC435	Single 3 1/2" drive	£119.95
BBC435D	Dual 3 1/2" drive	£217.95
BBC435DP	Dual 3 1/2" drive with PSU	£242.95

All prices inc vat and carriage.



**MIDWICH  
THAME  
LTD.**

GILRAY ROAD, DISS,  
NORFOLK, IP22 3EU

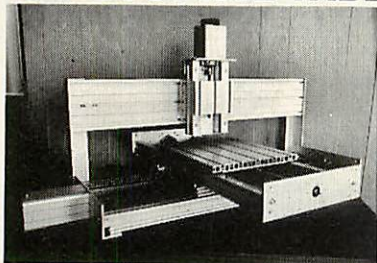
A member of the Memec (Memory and Electronic Components) PLC Group

**TELEPHONE:**

**0379 4131**  
**RING US TODAY!**

**NEW**

### LOW COST XYZ TABLES



250 x 400 x 80mm TRAVEL

**XYZ assembly with 3 stepper motors and screw drives  
£936 + VAT**

**Industrial version with ball screws £1,356 + VAT**  
**Stepper motor driver rack with interface for  
RS 232 £850 + VAT**

### INCREMENTAL ENCODER INTERFACE

**reads positions of rotary or linear TTL encoder pulses direct to  
screen with one line of basic code per encoder**



**3 encoder P.C.B. assembled/tested/  
uncased £300 + VAT**

**LEEWOOD DEVELOPMENTS LTD**  
**UPTON, CAMBS**  
**Phone (0480) 890860**

AA285

FOR  
BBC "W"8

### 16K SIDEWAYS RAM MODULE



- 16K LOW-POWER CMOS RAM
- NO SOLDERING REQUIRED
- FOR SIDEWAYS ROM SOCKET
- FITTING INSTRUCTIONS
- £12

**FROM  
£12 inc  
vat**

- SIDEWAYS RAM UTILITIES  
WITH
- 15K PRINTER BUFFER
  - PROGRAMMERS AIDS (INC SLOMO)
  - £5
  - (40/80 DISC)

- BOTH THE ABOVE FOR £14
- FOR WRITE PROTECT SWITCH ADD £2

ELECTRONIC DESIGNERS ?  
FILTER DESIGN MK 2 - A PROGRAM WHICH  
DESIGNS ANALOGUE FILTERS. £25. SAE FOR INFORMATION

Free P&P. Allow 21 days for delivery. Send Cheques / PO to  
BRAINSOFT, MIDDLE HUISS, INSTOW, Nr BIDEFORD, DEVON, EX 39 4LT

### NEW! MASTER-ART for the BBC Master 128

Produce amazing graphics with this exciting new Art program specifically written for the MASTER 128. A new, very easy to use graphic tool for the artistic and fun for everyone!

#### Features

- \* Uses all 64k of sideways ram.
- \* Circle, ellipse, line, rubber banding, spray, radial line, square, parallelogram, inverse, Gcol, text (three different sizes and angles)
- \* VDU recorder - draw your pictures then watch them recreated
- \* Colours 64 shades not including flashing colours
- \* Input device; keyboard, mouse or trackball
- \* Easily create screens in Mode 2
- \* Menu driven - Pop up windows
- \* Scroll between screens in memory
- \* Switch between shadow and normal screen
- \* Copy and paste between screens
- \* Animation \* Clock \* Print out facility

Double discs set 40 or 80 track DFS.  
Please specify when ordering.  
Send £25.00 inc. P&P to:

**NUMBER 3 SOFTWARE**  
**3 Dairy Farm Court**  
**Attleborough, Norfolk NR17 2BT**



ompet&80&81&82  
&5it&83&84  
&3ut&80&81&85&86&82  
&5er&87&88&89

giving a total of 27 characters for 13 words.

ASCII codes are divided in the dictionary as follows:

0-31 number of characters similar to previous root

32-90 character in root

91-255 ending

## Constant check time

Many spell checking programs process texts by reading a word at a time and looking for the word in the dictionary. This can happen when the text is being typed into a wordprocessor to provide interactive operation. Disadvantages of this approach are a slowing down of the wordprocessor and a possible distraction to the user. It is usually necessary to check the text again when the writing and editing have been finished.

*ViewSpell* uses a different approach which precludes an interactive mode but provides a constant check time for documents of any size. Reading each word from the text and looking it up in the dictionary gives a check time in proportion to the number of words in the text. With *ViewSpell* the text is first read word-by-word and the words are sorted into alphabetical order (in reality, *ViewSpell* order). Then the word list is simply merged against the dictionary. The time taken to do this is dependent upon reading the dictionary from the disc, as comparing the words takes a negligible time. On the DFS this takes about 2.5 minutes, on Winchester with ADFS less than 20 seconds, with a RAM disc even faster. The check times are constant for large text files and the worst case.

In fact for small text files the times will be shorter. When merging, *ViewSpell* can sometimes skip parts of the dictionary. For example, if the only words beginning with the letter 'a' are 'a' and 'aardvark' the program will find these two words very quickly and go straight onto the 'b' section.

Sorting the words on loading enables *ViewSpell* to handle much larger documents than would fit in memory as ordinary text. Consequently only exceptional texts such as dictionary dumps will not fit into mode 3 on a BBC model B micro. For example a draft of the *ViewSpell* user guide contained 7240 words taking up 42,000 bytes. This became 968 unique words in *ViewSpell*, taking up just 5100 bytes. A draft of this article was 1079 words taking up 6471 bytes but 361 unique words taking up 1627 bytes in *ViewSpell*.

ACORNSOFT  
The choice of experience  
in software.

## ViewSpell

for the British Broadcasting Corporation Microcomputer

**view**, *vū*, *n.* sight: inspection, examination: natural prospect: direction in which a thing is seen: intention, object (*with a view to, of*).—*v.t.* to see: whole extent seen: a sketch: reach of the sight: mental survey: look at on television: mode of looking at: look at attentively: the picture of a scene: opinion: examine interlectually.—Also *v.i.*

### The ViewSpell/User Guide

```
ViewSpell
Bytes free 27790
Source example
16 words
Screen mode 3

=>Load example
Loading.....
429 words
210 unique words
=>CHECK
Checking master dictionary.....
.....
16 words not found
User dictionary?
=>
```

### Searching the master dictionary

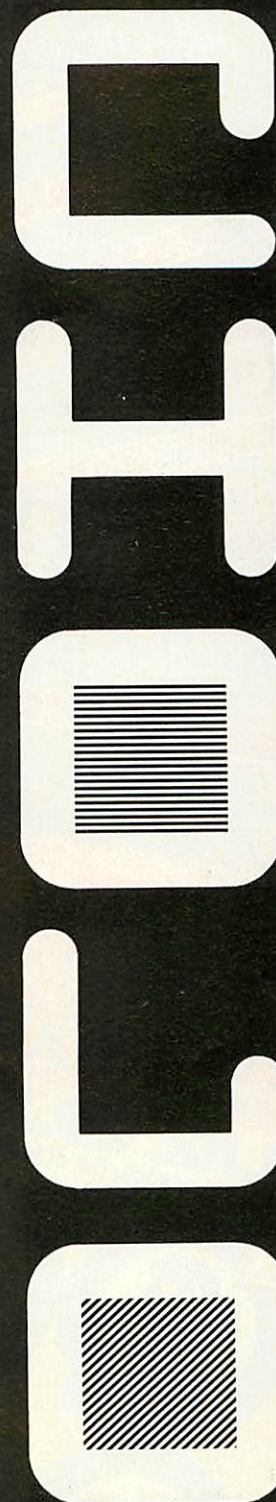
The master dictionary and its attributes are stored on disc in three files. W.master1 contains the words, T.master1 contains a list of the tokens and O.master1 contains a list of offsets to each of the 26 letter sections in W.master1. By duplicating these files it would be possible to run *ViewSpell* with a new master dictionary of, say, Welsh words. Since a different set of endings could be used, some research could be done to find the 160 most common Welsh word endings.

If you wish to build your own master dictionary contact Acornsoft.

### Token endings

Table 1 is the list of endings that have been tokenised and their associated tokens. The compilation of the master dictionary and the research to find these endings was carried out by the Longman Publishing Group.

*ViewSpell* consists of a ROM, disc, User Guide and reference card. Runs on all BBC models, will not run on a 40 track disc drive (80 track only) or a 0.9 DFS. Available from Acornsoft for £39.95.





# STRETCH YOUR MUSCLES

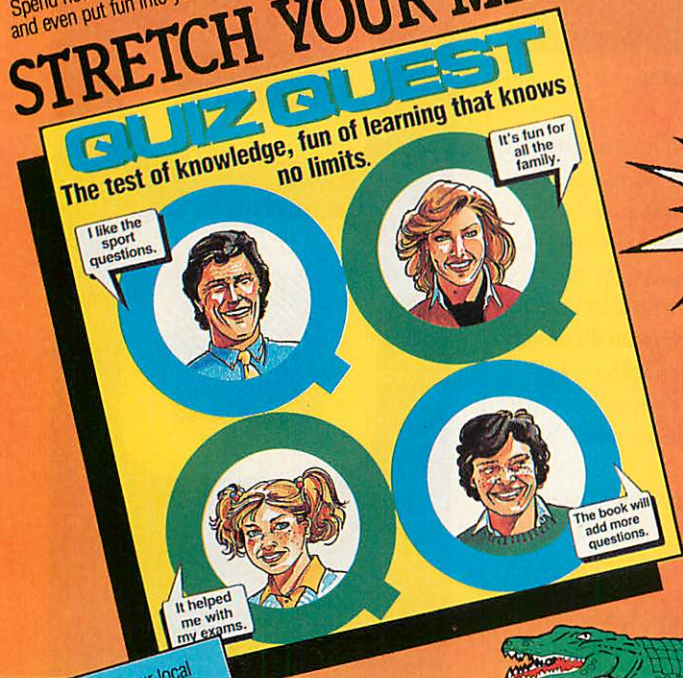


All disks  
**£9.95**

(40 track standard. Specify  
80 track if required)

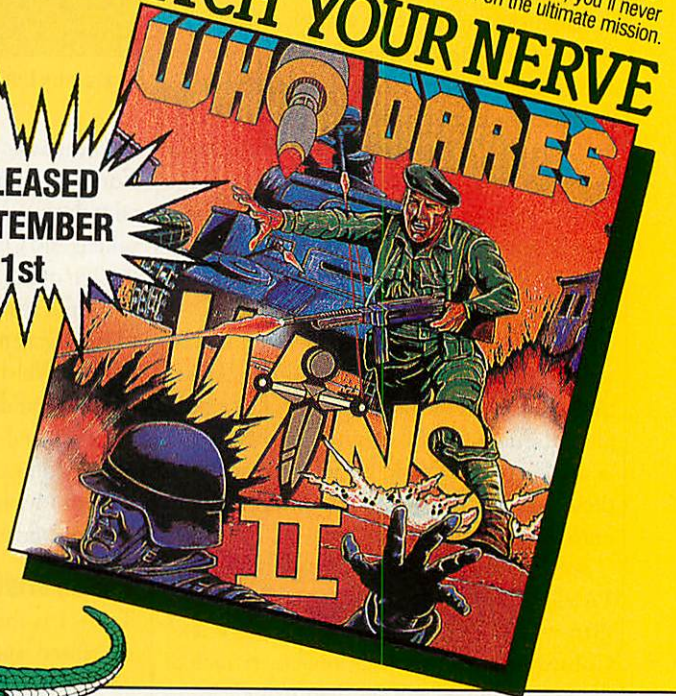
Over 200 questions on each of your favourite subjects — General Knowledge I, Sport, TV, Pop Music, General Knowledge II, plus a self program tape from which you can make up your very own quiz games. Spend hours of enjoyment with friends and family in light hearted challenge and even put fun into your homework & revision.

## STRETCH YOUR MIND

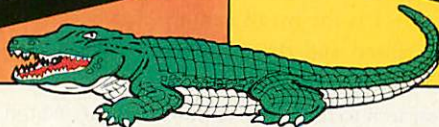


Only the bravest volunteer for the ultimate suicide mission to free lost compatriots held prisoner by the armies of death, the forces of oppression. Only the fearless dare take up a challenge where courage and endurance are as essential as intelligence and skill. Compulsive. Action packed. Step forward, modern day hero, you'll never know how good you really are until you've tested yourself on the ultimate mission.

## STRETCH YOUR NERVE



RELEASED  
SEPTEMBER  
1st



Alligata Software Ltd

# THE BEST SOFTWARE FOR BBC DISK AT ANY STRETCH OF THE IMAGINATION

Alligata Software Ltd. 1 Orange Street, Sheffield S1 4DW. Tel: (0742) 755796

Available from your local BBC software stockists or direct by mail order from Alligata Software Ltd. Please make cheques/P.O. payable to Alligata Software Ltd. or telephone credit card number to (0742) 755796



# ACORN FORUM

Whether you've got a Master, BBC micro, Electron or Atom, Acorn User readers have some good ideas to share. Presented by Mike Barwise and Bruce Smith

## DELVING INTO THE DISC DRIVE

Martin Phillips' comparative review of books covering the use of disc drives stirred up considerable controversy which resulted in a flood of letters into the *AU* office.

In his review Martin stated that side 0 of a disc drive is on the underside, ie the bottom – and on double sided drives, side 2 is the top side of the disc. This is the reverse of what

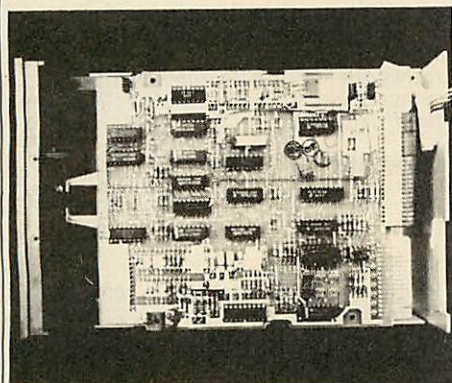


Figure 1. Bird's eye view of a track drive

many of you thought, that is that the top of the disc is side 0 and the bottom is side 2. The truth of the matter is that Martin is quite correct in his statement – side 0 (and thus drive 0) is on the bottom side of the disc and side 2 (drive 2) is on the upper top side!

In an effort to clear up this whole misconception, the following sequence of photographs should leave you in no doubt as to which is which as we pull apart a disc drive.

It is important to emphasise that the inner workings of a disc drive are very delicate and we do not recommend that you remove the case of your disc drive to examine its contents unless you are confident in your technical ability to do so safely.

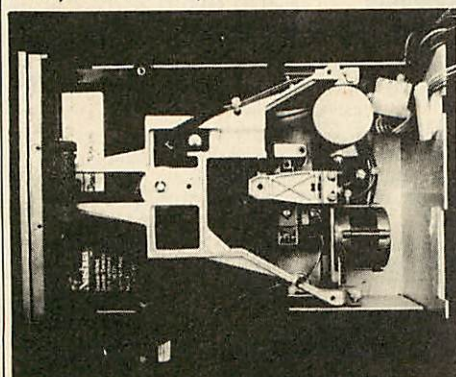


Figure 2. The mechanics of the disc drive

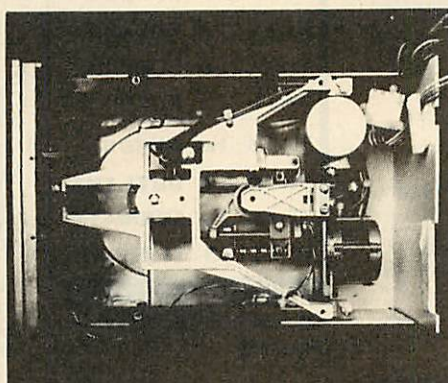


Figure 3. The disc removed to reveal the hub

Figure 1 shows a bird's eye view of an old Acorn 40 track drive from the *Acorn User* office with the top off. The front of the drive is to the left. The drive is dominated by its electronics and these are situated on a printed circuit board (PCB). The PCB contains all the chips and connections that allow your computer to talk to the disc surface. On the lower right-hand end of the PCB you can see what looks like a series of silver fingers (17 in all), this is an edge connector, which normally has connected to it the grey ribbon cable which

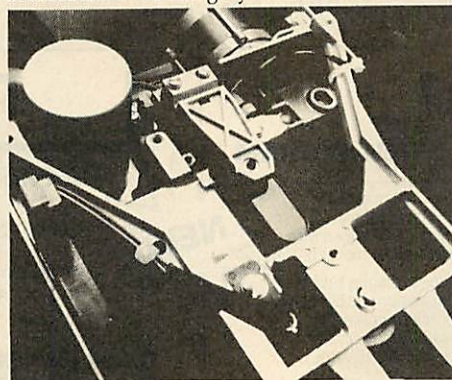


Figure 4. A close-up of the indexing detector

plugs into the disc drive port on the underside of your BBC micro/Master or relevant position on an Electron disc interface. The cable has, of course, been removed for the photograph. It is along this that information passes between the disc surface and computer. At the top right-hand side of the PCB, the four lead power cable can be seen trailing away. This plugs into the auxiliary power socket on a BBC micro or Master.

Many disc drives have a built-in power supply – in such cases this would be enclosed inside a metal case at the rear of the disc drive – to the right in the photograph.

Figure 2 shows the PCB removed. The

mechanics of the disc drive are all exposed – and a disc can be seen sitting comfortably in position. Working through the picture from left to right we can see first of all that the disc drive door is open. The door controls the vertical movement of the wire cutter shaped mechanism spread across the inside of the case. This mechanism is hinged at the either side of the drive (top and bottom in the picture) where the two screw heads are located. When the door is closed the mechanism hinges down towards the disc. Situated in the centre of the hinging mechanism is the 'hub'. This is seen more clearly on figure 3 in which the disc has been removed. The hub is in effect a locating ring which fits into the spindle hole – the large hole in the centre of a disc. This locates the disc centrally in the drive and engages into

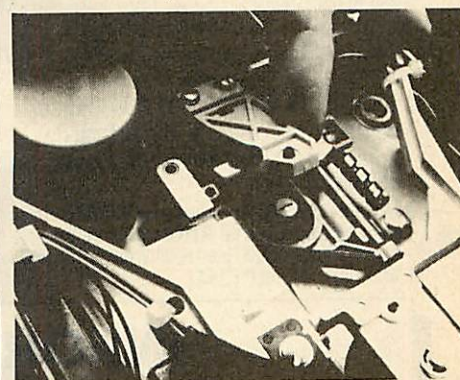


Figure 5. The read/write head is clearly seen

the disc motor which spins the disc.

In addition figure 3 clearly shows the small black rectangular assembly – this locates over the smaller hole on the disc – the index pulse hole. The rectangular box contains a light source/detector system which allows the drive to find the start of each track on the disc. A very small hole exists in this position on the disc – when it comes into position under the light source – light passes through it striking the sensor on the underside of the disc – known as the index pulse.

Figure 4 shows a close up of the indexing detector and hub. The disc is in position again and the surface of the disc can be seen through the read/write window on the disc envelope. The mechanism sitting over the top end of the read/write window contains a felt pressure pad on its underside and this holds the disc surface steady on the read/write head immediately below on the other side of the disc.

The final photograph in the sequence is taken in the same position as figure 4 but with



# CJEmicro's

ALL CJE MICRO'S SOFTWARE IS B, B PLUS & MASTER COMPATIBLE.

ENHANCED!

## Multi-Font NLQ

**Converts most printers to  
NEAR LETTER QUALITY**  
in user definable Fonts.

For EPSON & EPSON Compatibles, including  
MX/RX/FX/LX 80/100, STAR DP510/Gemini  
10X/SG10/NL10 & Citizen 120D.

Simple to use, standard EPSON codes for Underline and  
Doublewidth used.

After initialising Multi-Font NLQ with a \*MFNLQ, Multi-Font NLQ  
is normally transparent to the user. Multi-Font does claim some  
memory for workspace and storing font data.  
Multi-Font NLQ comprises of MFNLQ ROM for the BBC, and utility  
disc containing the FONT definer, ten fonts, BASIC demonstration  
program, VIEW demo text file and Driver.

Multi-Font NLQ is compatible with nearly all software, including  
most BASIC programs, VIEW, WORDWISE & InterWORD  
(SCRIBE & Printer Buffer software currently not supported).

Ten fonts are supplied or create your own using the font definer  
supplied.

Fonts included are:-

Standard NLQ, Courier, Italic, Gothic, CompTS, Bold, Shadow,  
Outline, Broadway E, Theatre

Additional Font Disc 'MF-B' contains:-

Hand, Script, Stencil, Broadway, Caps, Italic-Plain, Meccano, Plain,  
STD large, Wire, Greek/Maths and Inverse.

For Canon & Taxan Kaga users we recommend FONTAID in  
preference to Multi-Font NLQ.

Multi-Font NLQ (ROM and 40/80 Disc) **£30.00**

Additional font disc 'MF-B' (12 fonts) **£15.00**

Additional font disc 'MF-C' (15 fonts) **£15.00**

P & P on MFNLQ **£ 1.00**

**MASTER Write Protect and ROM select switch.**

**Two switches set to RAM slots to be:-**

Internal ROM or RAM Read and Write or RAM Read only.

£12.00 inc. VAT. P & P £1.00.

This is Standard

This is COURIER

This is ITALIC

This is BOLD

This is COMPTS

This is BOLD

This is SHADOW

This is OUTLINE

This is BROADWAY

This is THEATRE

### EXAMPLE OF MFNLQ FONTS

Additional disc 'A' gives an extra 11 fonts including:-  
Greek/Maths, Plain, Hand & (Elite, Condensed, & Super Condensed).

Now included is a facility to issue \*\* commands within a VIEW document.

To download new fonts within VIEW documents, the FONTAID ROM needs to be  
fitted in the BBC. (All other FONTAID facilities are available on both the FONTAID  
ROM & DISC). Fonts are always downloaded from Disc.

Fontaid is recommended to Canon & Taxan Kaga owners in preference to Multi-  
Font NLQ. As downloadable NLQ is a built-in facility of the Printer, full access to all  
the printers control codes is still allowed. The resolution of the FONTAID NLQ is  
also slightly higher than that of Multi-Font NLQ.

FONTAID requires 6264 RAM chip in printer.

FONTAID ROM & STD Font disc

(40 or 80 track)

**£30.00**

FONTAID ROM & STD Font disc with 6264 RAM

(40 or 80 track)

**£36.00**

FONTAID Additional Font DISC 'A' (11 fonts)

(40 or 80 track)

**£15.00**

FONTAID Additional Font DISC 'B' (13 fonts)

(40 or 80 track)

**£15.00**

FONTAID Additional Font DISC 'C' (15 fonts)

(40 or 80 track)

**£15.00**

FONT ROMS of individual fonts are available eg "Square".  
P & P on FONTAID

**£18.00**  
**£ 1.00**

## INFORM

### A UNIQUE NEW POWERFUL USE FOR SIDEWAYS RAM

INFORM has been developed specifically to take full advantage of the  
Sideways RAM facility that many BBC micro users now have. Inform is  
compatible with most SIDEWAYS RAM units including ATPL Sidewise with  
RAM, Solidisc SWR, BBC B PLUS 128K & BBC MASTER series (not SDL256)

INFORM is a very powerful facility, which allows the user to display text  
information, of any kind, from Sideways RAM. This information can be readily  
accessed by using \*\* commands from the keyboard or from application  
programs. In this way, much information can be displayed on the screen  
without stopping the current task, such as entering text in WORDWISE or  
VIEW.

The information in the RAM can be changed dynamically at any time.

Some of the possible applications for INFORM are:-

An on screen help manual can be created for your application, so that a  
reminder about more obscure points can be displayed at the users request.  
Information on your program or datafile contents, can remind you of their  
purpose.

Address and/or telephone numbers can be held and displayed quickly even  
while other applications are running. Very useful if you need to quickly display  
information about a client while he is hanging on the end of a phone!

Current prices for your products or stock position can be recalled instantly  
and readily modified using a wordprocessor. Similar files may be created from  
most databases such as VIEWSTORE.

In fact, any information to which you frequently refer can be displayed  
immediately without running another program. Your use of INFORM is only  
limited by your imagination, as they say!

There are three Inform Data Files (I.D.F.), of often used information, supplied  
on the disk to give an indication of the use of INFORM.

To use INFORM you must have Sideways RAM.

**INFORM on 40/80 track disc. P & P on INFORM £1.00 £20.00**

## PRINTERS

**NOW FREE DELIVERY** on PRINTERS (by courier)

Ring for sample printouts, full specification and latest prices.

Near Letter Quality Printers all with Centronics interface.  
Friction and Tractor feed.

**Canon PW1080A £270.00**

**Canon PW1156A (15") £414.00**

**Citizen 120D £180.00**

**JUKI 5510 £260.00**

**JUKI 5520 Colour Printer £430.00**

**Letter Quality Printer**

**JUKI 6100 Daisywheel £300.00**

**BBC Cable £ 8.00**

Inclusive of  
VAT & Delivery  
Ring for  
latest prices.

CJE BBC Printer PACKS include:-

CABLE to BBC 1.25M, M/C two tone screen dump, Screen  
text dump, Function key set up program, Function key label  
printing program, VIEW driver, Character defining program  
for downloadable character set (draft mode), 100 sheets of  
paper, Mains plug with 3AMP Fuse, Booklet giving  
instruction on pack software and general details of using  
the printer with a BBC.

C.J.E. BBC Printer Packs are £15.00 cassette (£16.00 disc)  
(e.g. CANON PW1080A with Printer pack £270 + £15 = £285  
everything included)

**TRADE & EXPORT ORDERS WELCOME** please inquire for delivery cost.

**PRICES INCLUDE VAT**

Phone/Credit Card and Official Orders welcome.

Full range of Printer, BBC, AMSTRAD & ATARI accessories available. **Official ACORN approved Dealer.**

C.J.E. MICRO'S (Dept AU10) 78 Brighton Road  
Worthing W. Sussex BN11 2EN (0903) 213361

CJEmicro's



the disc removed and the pressure pad head held back. The read/write head can be clearly seen fixed on the base of the drive pointing upwards, the head shows as a shiny pointed surface. This clearly shows that on this single sided drive—side 0 is in fact on the bottom!

£5

## SCRAMBLING BASIC FOR SECURITY

Graham Jones, a programmer from Rishton in Lancashire, gives us the benefit of his professional expertise in the following short routine. This provides a limited encryption/decryption facility to any BBC Basic program and earns him £5.

This is a very neat answer to the problem of 'low level' piracy (giving a copy to a friend) which can render good software unsaleable in no time at all. I must admit that I feel very strongly about this—few copiers stop to think how much time and effort have been put into what they are ripping off.

Graham writes: The routine works by 'scrambling' the contents of each program line according to the password input. Once the whole program has been scrambled, it can be saved just as any other normal Basic program, but if it is listed it will appear as a jumble of random-looking characters, control codes and keywords.

The only program line not to be scrambled is line zero, as this contains the password operated scramble/descrambler routine.

When you come to load your program back into memory (using CHAIN), the descrambling routine will be activated and you will be asked to enter the password. The only way to descramble the program is to enter exactly the same password that was used to scramble it.

To use the password routine, add the following to your program (after making a backup for safety's sake):

```
0 CLS: INPUT "Password :  
" P$: I%=PAGE+1: I%=I%+I%?2  
: REPEAT: L%=256*?I%+I%?1: PR  
INT "Line : "; L%; HR$13; : FOR  
B%=I%+3 TO I%+I%?2-2: ?B%=  
?B% EOR ASC (MID$(P$, (B%-1%  
-2) MOD LEN(P$), 1)): NEXT B%:  
I%=I%+I%?2: UNTIL ?I%=255: PR  
INT "
```

To scramble your program, type: RUN  
>RETURN< then enter your password and press Return.

The line numbers currently being scrambled will appear on the screen. When the last program line has been scrambled, an error message will appear. This is because the com-

puter has attempted to run the scrambled program. At this point you should *not* attempt to list your program under any circumstances. To save the program, just type: SAVE "PROGRAM">RETURN>

When you have loaded a scrambled program (using CHAIN), you are asked to enter the password. Enter the same password that you used to scramble the program. The line numbers currently being descrambled will appear on the screen as before. When descrambling is complete, your program will run as normal.

£5

## PRINTING ITALICS

R J Speight of Fownhope, Hereford earns himself a portrait of the Duke of Wellington for the following nifty program.

The new Epson LX-80 printer cannot mix italics with its Near Letter Quality (NLQ) text. However, the impossible is made possible with this short program:

```
10 VDU 1,27,1,120,1,1  
20 VDU 1,27,1,120,1,0  
30 VDU 1,27,1,15  
40 VDU 1,27,1,87,1,1  
50 VDU 1,27,1,77  
60 VDU 1,27,1,69  
70 VDU 1,27,1,71  
80 VDU 1,27,1,52  
90 VDU 2  
100 FOR N%=0 TO 4  
110 FOR C%=32 TO 127  
120 VDU C%: NEXT  
130 NEXT  
140 VDU 3
```

The program prints out the character set though any further text you print will be of course be in the NLQ italics mode!

£5

## BEING BOLD

Jeffrey Morgan of Cardiff has sent in a useful routine for owners of the Brother HR-5 printer. While Jeffrey doesn't claim that his routine will give you NLQ print it will improve the quality of the lettering by making the printer print the same line of text twice, thereby giving a much bolder appearance to the letters.

The dip switch (8-segment parallel only) segment 102 is set to 'one', it must first be set to the 'off' position before using the program. The program is in fact a procedure and assumes that the line of text to be printed is passed into the procedure.

The procedure is as follows:

```
1000 DEF PROCprint (text$)  
1010 VDU 2  
1020 *FX 6,10  
1030 PRINT text$,text$  
1040 *FX 6  
1050 PRINT CHR$(13)  
1060 VDU 3  
1070 ENDPROC
```

The procedure can be called in a variety of ways, passing the text directly with:

```
PROCprint ("This is bold text")
```

or via a string with:

```
PROCprint (A$)
```

where A\$ contains the text to be printed.

## ADFS 'E' ATTRIBUTE RECOVERY

ADFS allows files to be only '\*RUN' if attribute 'E' is specified by \*ACCESS ie: \*ACCESS <filename> E. This can be useful. However, once set, you will find it difficult to unset. There is no facility supplied to do this directly, but if you have an ADFS-compatible disc sector editor, such as that supplied with BBC Soft's *Monitor ROM* or ACP's *Advanced Disc Toolkit ROM* (\*DEX), then there is a way around this. Suppose we have a directory \$.GAMES as follows:

```
GAMES (02)  
Dir. GAMES Lib. Library  
PLANET2 E (01) PROGRAM WR (02)
```

The file with the E attribute is PLANET2, and is stored in directory \$.GAMES. You would therefore move into the directory containing the directory "GAMES", which in this case would be \$.

Now enter \*INFO <dir name>, This should present something like:

```
GAMES DLR (01) 000224  
  
<name> <Access> <Sector>
```

Now run your disc editor to look at sector number <sector>. Move forward byte by byte until you find the filename of the 'E'-locked program. Make a note of the hex value shown by the fifth character of this name. Subtract 128 (&80) from this number and place this new value (hex) in its place.

Re-mount the disc using <\*MOUNT> or <\*ADFS> and you will find the file unaccessed. You can now use <\*ACCESS> to set any attributes you require.



EPROMS/8271 (Hitachi)			ROMS UPGRADES		
	Ex	Inc		Ex	Inc
	VAT	VAT		VAT	VAT
1-9 27128 250nS	2.57	2.95	Inter-Word	38.26	44.00
10- 27128 250nS	2.30	2.65	Inter-Sheet	38.26	44.00
1-9 2764 250nS	2.26	2.60	Inter-Chart	25.00	28.75
10- 2764 250nS	2.00	2.30	Wordwise Plus	38.26	44.00
1-9 27256 250nS	4.57	5.25	View 2.1	36.52	42.00
10- 27256 250nS	4.13	4.75	View 3.0	55.65	64.00
1-9 6264LP 150nS	3.04	3.50	ViewStore	36.52	42.00
10- 6264LP 150nS	2.57	2.95	Basic II	13.00	14.95
1-9 TTL/Cmos set	4.77	5.49	Acorn 1770 DFS	42.61	49.00
1-9 8271 controller	32.17	37.00	Acorn 8271 DFS	41.74	48.00
10- 8271 controller	30.43	35.00	B Plus 64K to 128K	26.00	29.90

MASTER SERIES			MONITORS		
	Ex	Inc		Ex	Inc
	VAT	VAT		VAT	VAT
Master 128K Micro	395.00	454.25	Philips CF1114	164.35	189.00
Master ET 128K Micro	338.00	388.70	Philips CM8533	233.91	269.00
512 Co-processor	334.78	385.00	Philips BM7502	70.43	81.00
Turbo Upgrade	103.48	119.00	Philips BM7522	75.65	87.00
Cartridges	14.95	14.95	Taxan KX1201G P31	88.70	102.00
Reference Manual Pt.1	14.95	14.95	Taxan KX1202G P39	103.48	119.00
Reference Manual Pt.2	14.95	14.95	Taxan KX1203G	103.48	119.00
View 3 User Guide	10.00	10.00	Taxan Sup. Vision 2	277.39	319.00
View Sheet User Guide	10.00	10.00	Microtec 1451MS	223.48	257.00
Master Dust Cover	3.00	3.45			

DISC DRIVES - SPECIAL OFFER 400K Drive & Acorn DFS £149.95 (inc. VAT)		
	Ex VAT	Inc VAT
Cumuna CSX100 100K single drive No PSU	84.35	97.00
Cumuna CSX400 400K single No PSU 40/80	120.00	138.00
Cumuna CS400 400K single + PSU 40/80	137.39	158.00
Cumuna CD800S 800K dual + PSU 40/80	253.04	290.00
Akhter MD400A Single 400K No PSU 40/80	100.00	115.00
Akhter MD802E Dual 800K + PSU 40/80	216.52	249.00
Akhter MD802D Dual 800K + Plinth + PSU 40/80	251.30	289.00

DISKETTES (lifetime warranty)		
	Ex VAT	Inc VAT
10 96 tpi D/S/D/D in library case	13.90	15.99
10 Low cost 96 tpi D/S/D/D in lib. case	7.39	8.50

TAXAN		KAGA KP810	
with BBC cable & paper £239.00 (£207.83 + VAT)			
KP910 17" width printer	346.96	Inc VAT	399.00
KP810 Paper roll	3.43		3.95
Fontaid (NLQ Designer)	26.00		29.90

KX-P1080		Canon PW1080A	
with BBC cable & paper £165.00 (£143.48 + VAT)		with BBC cable & paper £239.00 (£207.83 + VAT)	

Citizen 120D		Juki 5510	
with BBC cable & paper £175.00 (£152.17 + VAT)		with BBC cable & paper £239.00 (£207.83 + VAT)	

Juki 6100		Centronics GLP2	
with BBC cable & paper £269.00 (£233.91 + VAT)		with BBC cable & paper £159.00 (£138.26 + VAT)	

Epson LX86		Star NL10	
with BBC cable & paper £236.90 (£206.00 + VAT)		with BBC cable & paper £236.90 (£206.00 + VAT)	

PRINTER ADDONS			PRINTER RIBBONS		
	Ex	Inc		Ex	Inc
	VAT	VAT		VAT	VAT
LX Tractor Unit	18.22	20.95	Citizen 120D	4.00	4.60
LX Sheet Feeder	47.93	55.00	Epson FX/RX80	3.00	3.45
LX Dust Cover	4.00	4.60	Juki 5510	3.00	3.45
LX View Printer Driver	8.65	9.95	Juki 6100	1.32	1.52
Control/Dump Rom	13.00	14.95	KP810/910	4.80	5.52
KP Dust Cover	4.00	4.60	Canon PW	4.80	5.52
KP View Printer Driver	8.65	9.95	Epson LX	3.90	4.49
KP Control/Dump Rom	13.00	14.95	Star NL-10	4.80	5.52

**Phone for our best price before placing your order**  
**EDUCATIONAL & GOVERNMENT ORDERS WELCOME**  
 All products have a 12 month no quibble guarantee  
 Prices subject to variation without prior notification  
 We are closed all day Wednesday and Saturday Afternoon  
 Carriage 92p (80p + VAT) Securicor £6.90 + VAT)



**WeServe**

Next day delivery  
by Securicor

Acorn Dept,  
128 West Street,  
Portchester,  
Hants.  
PO16 9XE.  
Tel: 0705 325354

## C & F ASSOCIATES

### SELECTED BBC/ELECTRON PROGRAMS

BBC CASSETTE			BBC DISC		
Title	RRP	Our Price	Title	RRP	Our Price
Psychastria	7.95	6.75	Psychastria	11.95	10.75
Thrust	7.95	6.50	Mini Office 2	16.95	14.95
Mikie	6.95	6.95	Hyper Sports	12.95	10.95
Bombjack	9.95	7.50	Enthar 7	16.95	14.95
Airwolf	9.95	7.50	Rick Hanson	11.95	10.45
Commando	9.95	7.50	Project Thesius	11.95	10.45
Yie Ar Kung Fu	9.95	7.50	Speech	11.95	10.45
Exploding Fist	9.95	7.50	Exploding Fist	14.95	12.95
Cosmic Battlegrounds	9.95	7.50	Yie Ar Kung Fu	12.95	10.95
Commonwealth Games	7.95	6.50	Citadel	11.95	10.45
US Drag Racing	6.95	5.95	Thrust	11.95	10.45
Moon Cresta	7.95	6.50	Scrabble	14.95	12.95
Bug Eyes 2	7.95	6.50	The Hobbit	17.95	15.95
Winter Olympics	7.95	6.50	Lord of the Rings	19.95	16.95
Jet Set Willy	7.95	6.50	Karate Combat	11.95	10.45
Rick Hanson	9.95	7.95	Bruce Lee	14.95	12.95
Project Thesius	9.95	7.95	Moon Cresta	9.95	7.50
Beach-Head	9.95	7.50	Olympic Decathlon	9.95	7.50
Worm in Paradise	9.95	7.95	The Quill	22.95	19.95
Lord of the Rings	15.95	12.95	Commando	14.95	12.95
Repton	9.95	7.50	Graphic Adv. Creator	27.95	22.95
Repton 2	9.95	7.50			
Speech	9.95	7.50			
Citadel	9.95	7.50			
Nightshade	9.95	7.50			
Strike Force Harrier	9.95	7.50			
Karate Combat	8.95	6.95			
Phantom Combat	9.95	7.50			
Scrabble	12.95	10.95			
Death Star	9.95	7.50			
Price of Magic	9.95	7.50			
Dambusters	9.95	5.95			
Southern Belle	7.95	6.50			
Meg.Sports/Gen.Proj.	8.95	6.95			

**ELECTRON CASSETTE**

Title	RRP	Our Price
Commonwealth Games	7.95	6.50
Commando	9.95	7.50
Citadel	9.95	7.50
The Quill	16.95	14.95
Thrust	7.95	6.50
Mikie	8.95	6.95
Bug Eyes 2	7.95	6.50
Jet Set Willy	7.95	6.50
Repton 2	9.95	7.50
Psychastria	7.95	6.75

**ALL PRICES INCLUDE VAT AND POSTAGE & PACKING**  
 (Overseas Orders add £1.00 per item)  
 Cheques/PO payable to:  
**C & F ASSOCIATES**  
 AND SEND TO  
**C & F ASSOCIATES (AU) PO BOX 2 BIDEFORD EX39 3RE**  
 Tel: (023 73) 619  
 Orders normally dispatched within 24 hours of receipt  
 but allow a maximum of 7 days

## ZONEFOUR LTD.

### WE ARE DISKXPRESS AND MIMIC DISTRIBUTORS FOR THE U.K.

DISKXPRESS IN FREE LIBRARY CASES			
New universal 5 1/4"	10s	£11.95	
SS	10s	£9.95	
DS 48TPI	10s	£10.55	
DS 96TPI	10s	£10.95	
MIMIC IN FREE LIBRARY CASES			
DS 96TPI	10s	£9.95	
Flipsided	10s	£10.95	
MAXELL/AMSOFT			
3" DS	10s	£32.50	
Mimic CF2 DD	10s	£49.50	
5 1/4" BULK DISKXPRESS			
SS	25s	50s	100s
DS 48TPI	£18.00	£34.00	£60.00
DS 96TPI	£20.00	£38.00	£70.00
Universal	£22.50	£40.00	£75.00
BULK MIMIC	25s	50s	100s
DS 96TPI	£21.00	£37.50	£70.00
Flipsided	£25.00	£48.00	£88.00
BULK UNBRANDED 5 1/4"			
With sleeves, WP and labels	25s	50s	100s
SS 48TPI	£12.95	£25.00	£45.00
DS 48TPI	£13.95	£26.00	£47.00
DS 96TPI	£14.95	£27.00	£49.00
SONY			
3 1/2" DS	10s	£33.95	
UNLABELLED 3 1/2" IN LIBRARY CASE			
SS	10s	£17.95	
DS	10s	£22.95	
3 1/2" BULK DISKS			
SS	25s	50s	100s
DS	£40.00	£75.00	£140.00
DS	£50.00	£90.00	£175.00
STORAGE BOXES			
100 Lockable 5 1/4"			£9.95
40 Lockable 3 1/2"			£7.95

**ALL PRICES INCLUDE VAT AND P/P**  
 TO ORDER PLEASE CALL DIRECT DISK LINE:  
**ZONEFOUR, 65 CENTURY ROAD, LONDON E17 6JA**  
 Tel. 01-523 2059  
 PLEASE CALL FOR BULK AND INSTITUTIONAL PRICES



# GIVE YOUR BBC THE PC LOOK

WITH THE **Viglen** PROFESSIONAL CONSOLE UNIT (P.C.U.)



Give your BBC Micro System the professional PC-look by replacing your existing lid with this smartly styled package. House your computer, monitor, disk drives & ROM cartridge system neatly in this strongly constructed, high impact ABS unit, colour matched to the BBC micro, and give yourself an outfit to impress all who see it.

This unit will support monitors including 14" television sets.

Capable of accepting most internal expansion boards such as Solidisk, ATPL Sidewise, Midwich 16, RAMAMP 16+32k Exprom, Computer Village CVX16, HCR Sideways, 6502 2nd processor boards. Fully ventilated. Full fitting instructions.

DEALER  
ENQUIRIES  
WELCOME.

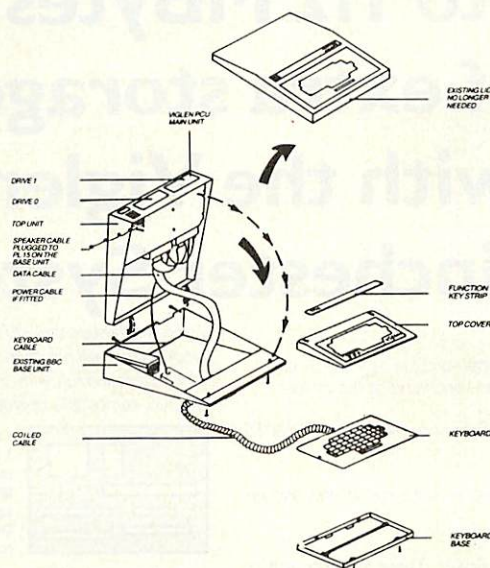


## Package includes:

- Keyboard case
- Screened main unit casing including internal fittings
- 2.0 metre coiled cable to connect main unit to keyboard
- Blanking plates included to blank out disk drive aperture
- Keyboard label

## ACCESSORIES (prices inc. VAT)

- 2.0 metre coiled cable on its own ..... £15
- Dual-drive data cable ..... £9
- Dual-drive power cables ..... £5
- Special internal switch mode power supply kit capable of running two half-height drives cool running ..... £29
- Fan kit, only necessary in extreme cases ..... £35
- Fitting available from ..... £15
- Extension keyboard on its own ..... £29
- Also available with single or dual drives ready fitted ..... Price on Application



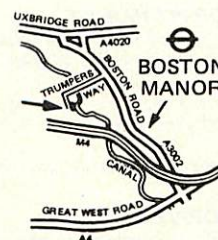
## How to order:

By post—  
Simply fill in the coupon.  
Enclose your Cheque, P.O. or use your Access, Barclaycard. Please make cheques payable to VIGLEN COMPUTER SUPPLIES and post to the address stated.

Allow seven days for delivery. Add £6.00 carriage, packing and insurance.

Or telephone:  
01-843 9903  
Credit card holders (Access, Barclaycard only) can purchase by telephone. Please give Card No. name, address and items required.  
Viglen are also major suppliers to educational and government establishments and welcome further enquiries and orders.

Unit 7, Trumpers Way,  
Hanwell W7 2QA  
Tel: 01-843 9903  
Personal callers:  
Monday-Friday 9.00–5.30pm  
Saturday 9.30–2.00pm



Free  
parking  
available

Post to: **VIGLEN LTD., UNIT 7, TRUMPERS WAY, HANWELL, LONDON W7 2QA.**

Telephone: 01-843 9903 AU 10/1

Please send me \_\_\_\_\_ (Qty) VIGLEN PC Unit(s) Plus Accessories \_\_\_\_\_ State ref numbers

I enclose Cheque/P.O. for \_\_\_\_\_ Please add £6 for postage, packing and insurance.

I prefer to pay by ACCESS/BARCLAYCARD\* Delete whichever is not applicable

Card No. \_\_\_\_\_ Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Tel. No. \_\_\_\_\_

Credit Cards valid if signed by Cardholder.  
Address below must be the same as card holders.





# MEGA BYTES FOR MINI BUCKS



If you want to increase your storage capacity up to an incredible 112 MBytes you need a Winchester; but not just any Winchester ... the new Viglen System is 100% compatible, with the Acorn Winchester; it's simplicity itself to install and it costs a lot less than you think.

The Viglen Winchester is ready to plug straight into your BBC Master or if you have a B or B plus you will simply have to fit an ADFS ROM. You can use up to two floppy disk drives in conjunction with the unit and, fitted to the B+ or Master, the floppies can double their capacity by running in double density mode.

The 112 Viglen Winchester System is equivalent in capacity to over 1000 100K floppies or 250 400K floppy disks. It takes under 2.5 seconds to save 200K bytes, making it at least ten times faster than the equivalent floppy disc options. The system is designed for virtually every application from education or business to home use.

## WHAT DO I GET FOR MY MONEY

1. Winchester Unit - (winchester drive, controller boards, power supply and fan all fitted in one compact case). The fan is recommended in order to keep the winchester at the correct operating temperature.
2. Acorn ADFS ROM - manual and ADFS utilities disc OR Master Reference manual part 1 (ADFS utilities are already supplied with Master).
3. Winchester user guide.
4. Additional utilities on the winchester including formatter, verifier, ADFS menu and backup programme.

## PLUG IN SECOND DRIVE

The Acorn ADFS can handle up to two winchester drives. These are accessed as drive 0 and 1 (the floppy disc drives being accessed as drives 4 and 5). Viglen winchesters are supplied as Drive 0 (single unit) and Drive 1 (Second drive for single unit). The Viglen drive 1 can be instantly plugged into drive 0 and used either as a backup for Drive 0 (and perhaps taken off and stored away) or for more online mass storage. This will enable you to back up 20 Megabytes in under 7 minutes.

## STORAGE OPTIONS:-

Drive 0	Drive 1	Total Capacity
20 Meg	20 or 40 Meg	40 or 60 Meg
28 Meg	28 or 56 Meg	56 or 84 Meg
40 Meg	20 or 40 Meg	60 or 80 Meg
56 Meg	28 or 56 Meg	84 or 112 Meg

AU10/2

TRADE ENQUIRIES: Viglen Products Limited,  
23/28 Penn Street, London N1. 01-729 2100.

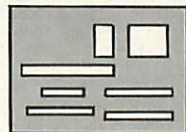


## Plug in 20 to 112 MBytes of extra storage with the Viglen Winchester System

	PRICE INC V.A.T.
<b>Drive 0 Single</b>	
* VB20 20M Winchester	759.00
* VB28 28M Winchester	799.00
* VB40 40M Winchester	1249.00
* VB56 56M Winchester	1349.00
<b>Drive 1 Second Drive</b>	
VB120 20 M Drive 1 Winchester	599.00
VB128 28M Drive 1 Winchester	649.00
VB140 40M Drive 1 Winchester	1049.00
VB156 56M Drive 1 Winchester	1099.00
Acorn 1770 upgrade kit (BBC B)	49.95
* All those starred have Acorn ADFS	

## COMPATABILITY!

Viglen winchesters are 100% compatible with the Acorn winchesters and the ADFS. Any program that will run on the Acorn winchester will also run on the Viglen winchester. The winchesters also run with the Acorn Master 512 board with DOS plus (CPM86 and MSDOS compatible operating system).



**1 MHz IN:** This socket is used to connect the micro to the winchester.

**1 MHz OUT:** This socket is used to connect any other device that is normally plugged into the 1 MHz bus on the micro.

**DRIVE 1 DATA:** This is a 20 way socket which is used to connect the data signals to a second winchester drive.

**DRIVE 1 CONTROL:** This is a 34 way socket which is used to connect the control signals to a second winchester drive.

## HOW TO ORDER

Simply write off today to Viglen and remember to add £8.00 carriage, packing and insurance, and allow 7 days for delivery. Credit card holders may order by telephone. If you'd like to find out more why not come down to our West London showroom (see map for directions) or if you can't make it simply ask for our special datasheet.



**SHOWROOM OPENING TIMES**  
MONDAY - FRIDAY 9.30 - 5.30  
SATURDAY 9.30 - 2.00

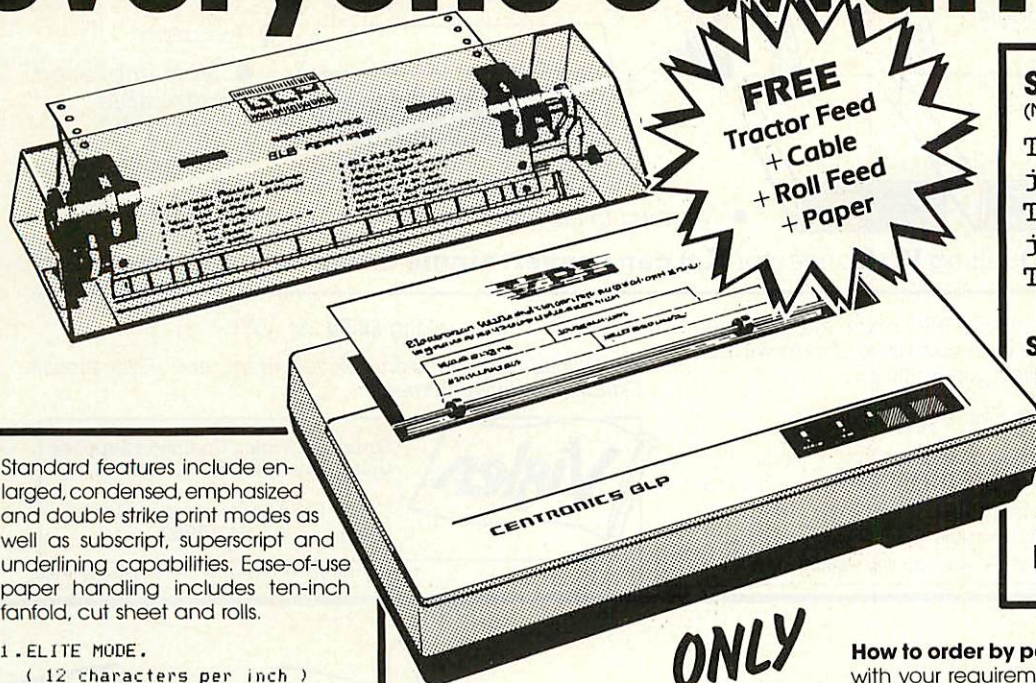
Orders from  
Educational  
Establishments,  
Government Departments  
and Plc Companies accepted.

Prices correct at time of going to press and subject to availability.

Viglen Computer supplies: Unit 7, Trumpers Way,  
Hanwell, London W7 2QA. Sales Hotline 01 843 9903.




**The Great Little Printer**  
**from Viglen at a price**  
**everyone can afford**



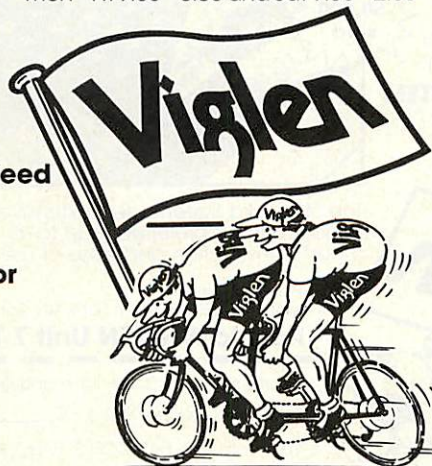
Standard features include enlarged, condensed, emphasized and double strike print modes as well as subscript, superscript and underlining capabilities. Ease-of-use paper handling includes ten-inch fanfold, cut sheet and rolls.

- All printers come standard with parallel interface
- 12cps Near Letter Quality
- Normal 50cps draft printing
- Separate tractor and friction feed
- Logic seeking head
- Uses normal A4 sheet paper or continuous stationery
- Original plus two copies
- 48 International characters
- Subscripts, superscripts and underlining
- Also available for IBM.



INCLUDING VAT

**Viglen Computer Supplies**  
Unit 7, Trumpers Way  
Hanwell W7 2QA  
Tel: 01-843 9903



**SAMPLE OF NLQ**  
(NEAR LETTER QUALITY)

**How to order by post** – Simply fill in the coupon below with your requirements. Enclose your Cheque/P.O. or use Access/Barclaycard. Please make cheques payable to VIGLEN COMPUTER SUPPLIES and post to the address shown on the left. Remember to add £8.00 for p&h and insurance. Allow seven days for delivery.

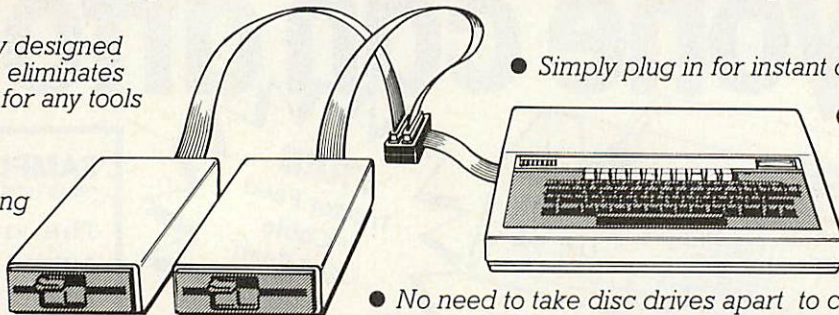
**To: Viglen Computer Supplies  
Unit 7, Trumpers Way, Hanwell, W7 2QA.**



# DUAL DRIVES FOR LESS THAN £17?

Convert your single disc drives into duals for only £16.95 inc. VAT

- Specially designed circuitry eliminates the need for any tools
- No soldering
- Simply plug in for instant dualling
- No mess
- New improved longer cable reaching the back of the computer
- No need to take disc drives apart to change links



**The Viglen DUCK (Dualling Up Connector Kit) can convert single drives to duals, instantly!**

Just plug the **Viglen Duck** into the BBC micro and any two single disc drives to create a dual disc drive. Drives will be configured Drive 0 and Drive 1 automatically.

- Fast Back-Up
- Fast Copying of Files

The **Viglen Duck** will dual-up any make or type of single disc drives with PSU (power supply unit). It will also work on single and double-sided drives in any combination. If you have disc drives without built-in PSU, then you will require a dual power connector for the BBC micro - available from Viglen for only £8.00 inc VAT.

- Postage and packing £2.50 inc. VAT.
- Official Orders from Government and Educational Establishment welcomed.



Orders to: Viglen Computer Supplies  
Unit 7, Trumpers Way, Hanwell W7

Credit Card holders may order by  
telephone: 01-843 9903

All prices correct at time of going to press



## YOUR ROMS WOULD BE HAPPIER IN A VIGLEN ROM CARTRIDGE SYSTEM

The safest way to look after your growing collection of ROMs is to store them in Viglen's specially designed cartridge systems, this not only keeps them happy, but also removes the risk of damage to your BBC micro.

There are two systems - the 'Standard' and the 'Low Profile'. Viglen is the leading producer of both.

### ADVANTAGES OF VIGLEN ROM CARTRIDGE SYSTEM

- All cartridges are gold-plated for durability and reliability, unlike others which are only silver plated.
- No need to switch machine off between cartridge changes.
- Insert and remove 'Wordwise' 'View' 'Disc Doctor', etc., at will, from your micro in absolute safety.
- Low, low power consumption unlike other systems.
- Save on memory.

**PRICE FOR COMPLETE KIT**, including 1 cartridge, 1 Cable Assembly, 1 Blanking Off Plate (used if system is removed), 1 Socket Cover (used when no cartridges are resident), 1 Cartridge Storage Rack.

**£15.95**

Extra Cartridges: £2.95 each, four for £11.00, ten for £26.50. Kit comes with 1 ROM Cartridge. All prices inc. VAT.



### THE STANDARD SYSTEM



The Standard System used extensively in education is preferred, due to its robust construction and ease of use.

Personal Callers  
Mon-Fri 9.00-5.30pm Sat 9.30-2pm

**Post to: VIGLEN Unit 7 Trumpers Way Hanwell W7 2QA**

Please send me (state type and quantity) \_\_\_\_\_ Kit(s) \_\_\_\_\_ Cartridges

I enclose Cheque/P.O. for £\_\_\_\_\_ Please add £2.50 for postage and packing (50p only for single cartridge)

I prefer to pay by ACCESS/BARCLAYCARD \* (Delete whichever is not applicable).

Card No. \_\_\_\_\_ Signature \_\_\_\_\_

Name \_\_\_\_\_ Address \_\_\_\_\_

AU 10/4

Credit Cards valid if signed by Cardholder. Address must be the same as card holder's.

Tel: 01-843 9903  
**ACCESS/BARCLAYCARD**  
Credit Card holders can purchase by telephone. Please give Card No., Name, Address, and items required.

### LOW PROFILE SYSTEM



With the sideways entry on the low profile system access to the escape and tab keys are slightly restricted. However Viglen better its rivals in this respect by being 3mm lower.



*The only way you might  
get a cheaper deal  
on your disc drive...*



# BUT THE BEST DEALS ON DISC DRIVES COME ONLY FROM VIGLEN

VIGLEN and their range of disc drives make the ideal team-mates for your computer, giving you fast responsive data access in seconds.

## Our highly competitive prices

### SINGLE DRIVES 40/80 400K

Single Drive **£115**  
Drive + Acorn DFS **£164**  
Integral PSU for single drive, add **£19**

### DUAL DRIVES 40/80 800K

Dual Drives **£215**  
Dual Drives + Acorn DFS **£264**  
Integral PSU for dual drive, add **£24**



Latest Acorn DFS. Call at factory for free fitting **£49** (with disc drive purchase only).

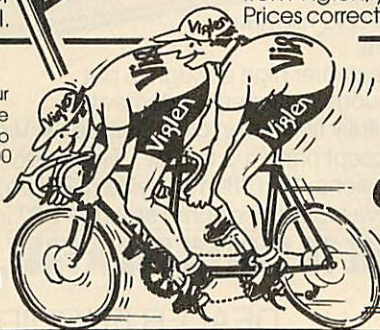
### All Offers include:

Utilities Disc includes formatting, verifying BASIC program comparator, disassembler, Epson screen dump, dual catalogue (giving 62 files), large printing and many others. All drives supplied with case, ribbon and power cables and comprehensive 56 page manual.

**How to order: by post** - To purchase any of these items, simply fill in the coupon with your requirements. Enclose your Cheque/P.O. or use your Access/Barclaycard. Please make cheques payable to VIGLEN COMPUTER SUPPLIES and post to the address above. Allow seven days for delivery, add £12.00 carriage, packing and insurance on all items.

**By telephone:** Ring (01) 843 9903. Credit Card holders (Access/Barclaycard only) can purchase by telephone. Please give Card No., Name, Address and items required.

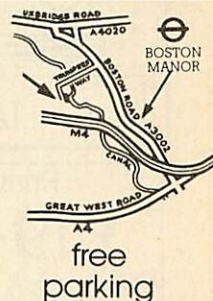
Viglen are also major suppliers to educational and government establishments and welcome further enquiries and orders.



**Remember,** whichever make of drive you purchase from Viglen, you can be assured of an excellent back-up service. Prices correct at time of going to press - offers subject to availability.

## THE BEST PARTNERS FOR YOUR COMPUTERS

Showroom/Factory open  
Monday - Friday 9.00 - 5.30  
Saturday 9.30 - 4.00  
**Tel: 01-843 9903**



**Post to:**  
**Viglen Computer Supplies**  
**Unit 7, Trumpers Way**  
**Hanwell, W7 2QA**

Please send me (state item number, type and quantity) .....

I enclose Cheque/P.O. for £..... add £12.00 carriage

Name .....

Address .....

I prefer to pay by ACCESS/  
BARCLAYCARD (delete whichever  
is not applicable)

Card No .....

Signature .....

Credit cards valid if signed  
by card holder. Address  
on coupon must be same  
as card holder.





# PINEAPPLE SOFTWARE

Programs for the BBC models 'B' with disc drive with FREE updating service on all software

## DIAGRAM

Still the only drawing program available for the BBC micro which gives you the ability to draw really large diagrams and scroll them smoothly around the screen stopping to edit them at any time if required.

Pineapple's unique method of storing the diagram information on disc means that the size of diagrams is limited only by the free space on disc, and not the amount of computer memory you have available. (A blank 80 track disc will allow up to 39 mode 0 screens of diagram).

The superb print routines supplied with the program enable large areas of the diagram to be printed in a single print run in a number of different sizes and rotated through 90 deg. if required. Full use can also be made of printers which have a wider than normal carriage available.

The program is fully compatible with the Marconi Tracker ball described below.

PLEASE STATE 40 or 80 TRACK DISC & WHETHER STANDARD BBC or MASTER VERSION IS REQUIRED

**PRICE £25.00 + VAT**

## DIAGRAM UTILITIES

A suite of six utility programs which add additional features to the 'Diagram' drawing program. The utilities include the saving and loading of areas of diagram to and from disc. The ability to display the whole of your large diagram on the screen at one time (in either 4\*4 or 8\*8 screen format). The addition of borders and screen indents to diagrams, and the ability to shift a whole diagram in any direction.

**PRICE £10.00 + VAT**

## MARCONI TRACKER BALL

This high quality device comes with its own Icon Artmaster drawing program and utilities to enable it to be used in place of keyboard keys, joysticks, or with your own programs.

**PRICE £60.00 + VAT p&p £1.75**

**PRICE INCLUDING 'DIAGRAM' SOFTWARE £79.00 + VAT p&p £1.75**

## TRACKER BALL for MASTER series

The Pointer ROM is supplied instead of the Icon Artmaster disc and enables the Tracker ball to work directly with the MASTER series computers. (e.g. to use with TIMPAINT etc.). Prices are the same as for the standard tracker ball.

## POINTER

The Pointer Rom is available separately for people already owning tracker balls, and comes with instructions for use with the MASTER computer.

**PRICE £12.50 + VAT**

## PCB

This new release from Pineapple is a printed circuit board draughting aid which is aimed at producing complex double sided PCB's very rapidly using a standard BBC micro and any FX compatible dot-matrix printer.

The program is supplied on EPROM and will run with any 32k BBC micro (including Master series). Also supplied is a disc containing a sample PCB layout to demonstrate the programs features.

By using an EPROM for the program code the maximum amount of RAM is available for storing component location and ASCII identification files etc. (Up to 500 components and 500 ASCII component descriptions may be stored for a given layout). There is no limit to the number of tracks for a given PCB, although the maximum size of board is restricted to 8" \* 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 scale, enabling direct contact printing to be used on resist covered copper clad board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

**PRICE £85.00 + VAT**

## CONVERTER LEADS

Converter leads to enable the Trackerball to run mouse software and the mouse to run trackerball software (inc. DIAGRAM). Please state which way round when ordering.

**PRICE £8.00 + VAT**

## BASIC COMPILER

Use our Basic Compiler to produce direct 6502 machine code programs and ROMs for your own Basic programs. Speed increases of up to 25 times are achieved.

**PRICE £25.00 + VAT**

**ALL ORDERS SENT BY  
RETURN OF POST**

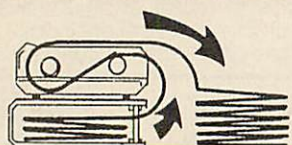
39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL. ☎ Tel: 01-599 1476

# NEW!

from

# Viglen

COMPUTER SUPPLIES



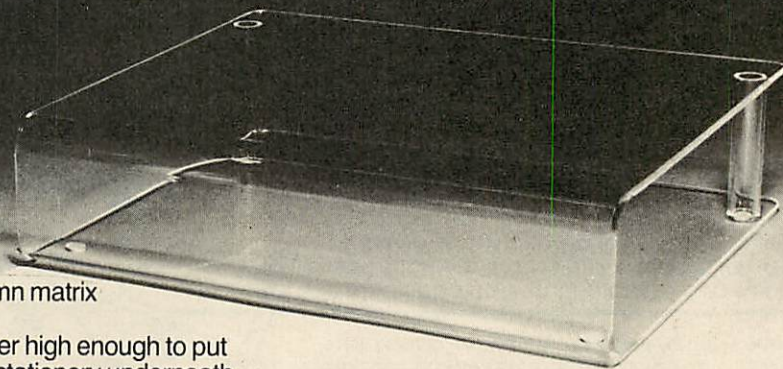
TABLE

Printer Stand

**£19.95** INC. VAT

Carriage & Packing £3.00

# A PRINTER STAND



- For 80 column matrix printers
  - Raises printer high enough to put continuous stationery underneath
  - Beautifully finished in clear perspex • Viglen quality every time
  - Will accept paper up to 12½" wide • Non slip rubber pads
- Dimensions: 15" (380mm) wide (320mm) deep 4" (90mm) high  
Also available 136 column stand @ £27 inc. VAT.

**COME TO VIGLEN FOR A FAST, FRIENDLY, PERSONAL SERVICE**

**DEALER ENQUIRIES WELCOME**

Orders welcomed from educational establishments and government departments

Prices subject to change without notice

AA63

Post to: VIGLEN COMPUTER SUPPLIES, UNIT 7, TRUMPERS WAY, HANWELL, LONDON W7 2QA.

Please send me \_\_\_\_\_ (qty) PRINTER STANDS at £22.95 each. I enclose Cheque/P.O. for £\_\_\_\_\_ made out to

VIGLEN COMPUTER SUPPLIES or debit my ACCESS/BARCLAYCARD No. \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_

Address \_\_\_\_\_

AU 10/6



# USER GROUPS

## LONDON

**London.** Association of London Computer Clubs: Robin Bradbeer, Polytechnic Of North London, Holloway, London N7 8DB  
**London.** Association of Computer Clubs: Rupert Steele, 12 Philbeach Gardens, London SW5 9DY  
**London.** Radio Amateur Micro User Group: contact by bulletin board No 86300198  
**East London.** SOBAT Computer Club: Mr T A Kayani, 12 Calderon Road, London E11 4EU  
 Tel: 01-556 5423  
**North London.** BBC Micro Users Group: Mr Ric Keyworth, 'The Penthouse', 4b Kilburn High Road, London NW6 5UL  
 Tel: 01-734 9235  
**North London.** North London BBC Micro User Group: 82 Hornsey Lane, London N6 5LU  
 Tel: 01-263 6760 (eves)  
**Wandsworth.** Wandsworth Computer Club: C Kendrick, Earlsfield Library, Magdalen Road, London SW16  
**West London.** Personal Computer Club: Chris, Tel: 01-743 1579; Steve, Tel: 01-540 6271; Blue, Tel: 01-579 5415

## SOUTH-EAST

**Aylesbury.** BBC Micro User Group: Aston Clinton County Combined School, Twitchell Lane, Aston Clinton, Aylesbury, Bucks HP22 5JJ  
 Tel: (0296) 630276  
**Bognor Regis.** Bognor Computer Group: ER Piper, 2 Ely Gardens, Aldwick Park, Bognor Regis, Sussex PO21 3RY  
**Bracknell.** Bracknell Primary Schools Computer Users Group: D Donaldson, Wildriders County Junior School, Netherton, Bracknell, Berks RG12 4DX  
**Brighton, Hove & District.** Brighton, Hove & District Computer Club: J Smith, 30 Leicester Villas, Hove, E. Sussex BN3 5SQ  
**Bucks.** South Bucks Acorn Computer Club: David Park, 160 White Hill, Chesham, Bucks HP5 1AZ  
 Tel: Chesham 783097  
**Camberley.** Camberley Computer Users Club: David Crosby-Clarke  
 Tel: Crowthorne 771590  
 Prestel mailbox 344771590  
**Carlshamton.** Acorn Atom User Club: Kevin Roll, 66 Shaldon Drive, Morden, Surrey  
 Tel: 01-540 5282  
**Caterham.** Computer Club: Caterham Leisure Centre, Godstone Road, Caterham, Surrey CR3 6RE  
**Dartford.** CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent  
 Tel: (0322) 22669  
**Guildford.** West Surrey Computer Club: Jan Spencer, 52 Lindfield Gardens, Guildford, Surrey GU1 1TS  
 Tel: (0483) 63512  
**Harpenden.** Harpenden Microcomputer Group: P Cowley, 36 Southdown Road, Harpenden, Herts AL5 1PG  
**Harrow.** Harrow Computer Group: Bazley Butcher, 16 St Peter's Close, Bushey Heath, Watford WD2 3LG  
 Tel: 01-950 7068  
**Ilford.** ILBUG: Peter Jones, 1 De Vere Gardens, Cranbrook, Ilford, Essex IG1 3EB  
 Tel: 01-554 9825  
**Iver.** Iver Computer Society: John Haigh, 11 Colliston Walk, Ford's Farm, Calcot, Reading, Berks RG3 5ZJ  
 Tel: (0734) 417534  
**North & Mid Essex.** User Group (NAMEBUG): Andy Purkiss, 12 Palm Close, Witham, Essex  
 Tel: (0376) 515609. Prestel: 376515609  
**Reading.** Reading User Group (RUG): Richard Rowlands, Tel: Reading 596825 (eves)

**South East Essex.** BBC User Group (SEEBUG): Miss J Lines, 97 Oakhurst Drive, Wickford, Essex SS12 0NW  
 Tel: (03744) 63396  
**Sutton.** Sutton Library Computer Club: The Secretary, 21 Village Row, Sutton, Surrey SM2 6JZ  
 Tel: 01-642 3102  
**Welling.** Computer Users Club: Tony Latham, 69 Hadlow Road, Welling, Kent DA16 1AX

## SOUTH & SOUTH-WEST

**Alton.** Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW  
 Tel: Alton 87478  
**Bristol.** Format 40/80 Club: BBC Disc User Group, Peter Hughes, 5 Marsh Street, Bristol BS1 4AA  
 Tel: (0272) 799979  
**Fareham.** Porchester & Fareham Computer Club: Simon Ward, 9a East Cams Close, Downend, Fareham, Hants PO16 8RP  
**Gosport.** Borough of Gosport BBC Users Group (BOGBUG), Graham Dubber, 128 Wych Lane, Gosport, Hants PO13 0TE  
 Tel: (0329) 282221 (evenings)  
**Radio.** AMRAC (Amateur Radio and Computers): Mr T Triggel, Gleness, East Boldre, Brockenhurst, Hants SO42 7WD  
 Tel: (0590) 612130

## MIDLANDS & ANGLIA

**Boston.** Boston Acorn Computer Users Club: J C Goodwin, 245 Church Green Road, Fishloft, Boston, Lincs PE21 0RP  
**Burton-on-Trent.** Beeb Users' Group (Bug Club): Mrs Linda Yeomans, 13 Regent Street, Church Gresley, Burton-on-Trent, Staffs DE11 9PL  
 Tel: (0283) 216445 (eves)  
**Cambridge.** Bottisham Acorn User Group: Peter Rank, Tel Cambridge 812080, or Gerald Wilcockson, 19 Gallows Hill, Saffron Walden, Essex CB11 4DA  
 Tel: Saffron Walden 23793  
**Derby.** The Derby Microcomputer Society: F Taylor, Secretary, c/o 5 Park View Close, Allestree, Derby DE3 2GH  
 Tel: Derby 559334  
**Glossop.** Glossop Computer Club (Derbyshire): T S Fox, 4 Park Lane, Little Hayfield, Stockport, Cheshire SK12 5NW  
 Tel: (0663) 44260  
**Huntingdon.** RAF Personal Computer Association: Sqn Ldr J A Upham, Man S (ADP), HQ RAFSC, RAF Brampton, Huntingdon PE18 8QL  
**Norwich.** Amateur Computer Club: Andy Leeder, Church Farm, Stratton St Michael, Norwich NR15 2QB  
**Norwich.** Norwich & District BBC Microcomputer User Group: Roy Street, Church Farmhouse, Themelthorpe, Dereham, Norfolk NR20 5PS  
 Tel: Foulsham 579  
**Nottingham.** Micro Club: John Day, 8 Warkton Close, Chilwell, Notts NG9 5FR  
 Tel: (0602) 225660. Prestel: 602225660  
**Redditch.** Redditch Computer Club: Anthony Green, 14 Radway Close, Redditch, Worcs B98 8RZ  
 Tel: (0527) 61434  
**Stoke.** POTBUG BBC User Group: J Forest, 50 Cliff Street, Smallthorpe, Stoke-on-Trent, Staffs  
 Tel: 818430  
**Stratford.** Stratford Computer Club: Chris Parry, 15 Kipling Road, Stratford-on-Avon  
 Tel: (0789) 68080  
**Suffolk.** West Suffolk BBC Micro Users' Club: Antony Hurden, 14 Plovers Way, Bury St Edmunds, Suffolk IP33 2NJ

## NORTH-WEST

**Cheshire.** Mid-Cheshire Computer Club: Michael Christie, 496 The High Street, Winsford, Cheshire  
**Cumbria.** West Cumbria User Group: P Majid Tel: (0946) 62732 or K Purkiss, Tel: (0946) 66586  
**Liverpool.** Mersey BBC User Group: Nik Kelly, 56 Queen's Drive, Liverpool L4 6SH  
**Rochdale.** Rochdale BBC Micro User Group: c/o 6 Dunbar Grove, Darnhill Estate, Heywood, Lancs OL10 3QJ  
**Wirral.** Wirral Micro Users Club: David Walsh, 28 Priory Close, Bebington, Wirral, Merseyside L63 3EG

## NORTH-EAST

**Huddersfield.** Huddersfield BBC Micro User Group: S Gill, 21 Mayfair Avenue, Sowood, Halifax, W. Yorks  
 Tel: (0422) 73058  
**Hull.** Forum 80: 421 Endike Lane, Hull HU6 8AG  
**Hull.** MUSE (for teachers): PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD  
 Tel: (0482) 20268  
**Keighly.** Keighly Computer Club: Colin Price, 'Apple Garth', The Hob Hill, Steeton, Keighly, W Yorks  
 Tel: (0535) 54738  
**Newcastle.** Newcastle & Washington BBC User Group (NEWBUG): Gary Bowmaker, c/o Washington Town Centre Library, The Galleries, Washington, Tyne & Wear  
 Tel: (0783) 813175 (eves)  
**Sheffield.** Parsons Cross BBC User Group: Andrew Grant, 28 Rokeby Road, Sheffield S5 9FU  
 Tel: (0742) 461203  
**S Yorks.** South Yorks Personal Computer Group: Bob Hindle, 139 Penrhyn Road, Sheffield S11 8UP  
**Wakefield.** Wakefield BBC Micro User Group: PO Box 66, Wakefield, West Yorkshire WF2 6YZ

## SCOTLAND

**Econet.** User Group (Scotland): c/o Michael Ryan, Balkeerie Cottage, Eassie, for Forfar, Angus  
**Central Scotland.** BBC User Group: D Davidson, 1 Roxburgh Place, Larbert, Stirlingshire FK5 4UE  
 Tel: (0324) 558692  
**Inverclyde.** Inverclyde BBC Micro Users Club: Robert Watt, 9 St John's Road, Gourrock, Renfrewshire PA19 1PL  
 Tel: Gourrock 39967

## WALES

**Cardiff.** Cardiff BBC Computer Club: Geoffrey Barker, 2 Whitcliffe Drive, Penarth CF6 2RY  
 Tel: (0222) 701023

## N. IRELAND

**Belfast.** Belfast Computer Club: Andrew White, 19 Greenpark Drive, Markethill, Co Armagh BT60 1PX

## OVERSEAS

**Australia.** BBC Users Group of Canberra: PO Box E58, Queen Victoria Terrace, ACT 2600  
**Australia.** Beebnet: M A Cowley, PO Box 262, Kingswood, South Australia 5062  
**Australia.** Ozbeeb Sydney, meetings North Ryde. PO Box 1030, Parramatta 2150  
 Tel: day 635 4868, eve 868 4455  
**Australia.** Dapto BBC User Group: PO Box 447, Dapto, NSW 2530  
**Canada.** Atom Users Group of Canada: John Wood, 812 Cabot Trail, Milton,

Ontario L9T 3M8  
**Canary Islands (Spain).** BBC Micro Club Tenerife: PO Box 560, 3800 Santa Cruz de Tenerife  
**Eire.** Irish Amateur Computer Club: Austin Vaughan, 35 Monastery Drive, Clondalkin, Dublin 22  
 Tel: 01-593112 (eves)  
**Eire.** OIFIG (Official Irish Forth Interest Group): c/o Hugh Dobbs, Newton School, Waterford  
**Finland.** Arjen Raateland, Hopeatie 10A21, 00440 Helsinki 44  
**France.** Club Informatique Assevent: Claude Laurent, 1 rue du Marechal Leclerc, Assevent 59600  
 Tel: (27) 652294  
**Greece.** Microclub: C Mantazavinos, 17 Stourara Str. 106 82 Athens  
**Hong Kong.** Acorn Computer Users Society of Hong Kong: PO Box 13330, Central PO, HK  
**Malaysia.** Sabah Computer User Group: c/o Albert Yun, PO Box 69, Kota Yun, Sabah, Malaysia  
**Malta.** BBC Micro Users Club (Malbeeb): Ray C Zammit, 20 Oleander Avenue, Santa Lucia  
**Netherlands.** Big Ben Club: J W Vuurpijl, Hein Baderstraat 36, 2171 XP Sassenheim  
**New Zealand.** BBC/Acorn Computer User Group of NZ: PO Box 9592, Wellington  
**New Zealand.** Christchurch BBC & Electron Users Group: Mrs Rebe Nolan, 87 Palmers Road, Christchurch 9  
**Norway.** BBC INFO: Horten Ingeniorhøgskole, Skippergt. 6, 3190 Horten  
**Norway.** Scandinavian BBC User Group: Frans-Otto Hendriks, Ludvig Karstensvei 14, 1064 Oslo 10  
**Pakistan.** BBC Users Group: Capt. Z A Kidwai  
 Tel: Karachi 540986  
**South Africa.** Acorn Atom Users Group: J G Dowling, 27 Orihi Avenue, Van Riebeeck Park, Kempton Park 1620  
**South Africa.** Pretoria BBC Users Group: Stan Miller, PO Box 117, Montana 0151  
**South Africa.** Tygerberg BBC User Group (Tygerbug): R P Donovan, 16 Bakker Street, Welgemoed, Bellville 7530  
**Sweden.** BBC User Group: Anders Wichman, Folkungagatan 58, 116 22 Stockholm  
**Tasmania.** BBC Users Group (Tasbeeb): Box 25 PO, North Hobart 7002

## SPECIAL INTEREST

**Accounts.** BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes  
 Tel: (0908) 564271  
**Adventure.** International Adventure Club: Simon Martin Clarke, 10 Ennis Close, Harpenden, Herts AL5 1SS  
**Bulletin Boards.** Forum 80: 421 Endike Lane, Hull HU6 8AG  
**CP/M.** CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent  
 Tel: (0322) 22669  
**Disc Users.** Format 40/80 Club (BBC Disc User Group): Peter Hughes, 5 Marsh Street, Bristol BS1 4AA  
**Education.** Micros and Primary Education (MAPE): c/o Mrs G Jones, 76 Sudbrooke Holme Drive, Sudbrooke, Lincs LN2 2SF  
**Electronics.** Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW  
 Tel: Alton 87478  
**Heraldry Society.** Colin Forrester, 5 Hook Road, Epsom, Surrey KT19 8TH  
**Logo.** British Logo Users Group (BLUG): Richard Olney, c/o London Technology Network, 86-100 St Pancras Way, London WC1  
**MUSE.** PO Box 43, Houghton on the Hill, Leicester LE7 9GX  
 Tel: (0533) 433839





800 ST ALBANS ROAD,  
GARSTON, WATFORD,  
HERTS. WD26NL.  
Tel: 0923 672102

WANTED FOR MASTER  
SERIES HARDWARE &  
SOFTWARE DESIGNS.  
PLEASE CONTACT THE  
ABOVE FOR DETAILS



## CARTRIDGES FOR MASTER SERIES

### CARE MASTER ROM EXTENDER:

Designed to enable owners of CARE or Viglen BBC Model B Cartridges. To now use them on the master series micros. The extender is capable of taking one 8K, 16K or 32K EPROM cartridge specifically designed to fit neatly into either of the Master cartridge slots, is unobtrusive and easy to use.

### CARE MASTER ROM CARTRIDGES:

Designed by CARE Electronics to Acorn Specifications. The CARE Master Cartridges offer three options for maximum user flexibility.

- Option 1: Standard Cartridge with 2 28pin I.C. sockets capable of taking up to 2 16K 27128 Eproms.
- Option 2: Single Zif version with 1 28pin Zif and 1 28pin I.C. sockets capable of taking up to 2 16K 27128 Eproms.
- Option 3: Dual Zif version with 2 28pin sockets capable of taking up to 2 16K 27128 Eproms.

Master 128K Micro	@ £454.25a
CARE Master ROM Extender	@ £9.20c
CARE BBC Model B Cartridges	@ £2.07c
Acorn Master ROM Cartridge	@ £14.95c
CARE Master ROM Cartridge	@ £10.81c
ZIF Socket Versions	
CARE Master ROM Cartridge (1 x Zif)	@ £16.56c
CARE Master ROM Cartridge (2 x Zif)	@ £21.62c

### FOR OTHER PRODUCTS AVAILABLE SEE OUR MAIN ADVERT

**HOW TO ORDER:** All prices inclusive of VAT. By Post. Enclose your cheque/P.O. made payable to CARE Electronics. Or use your ACCESS/VISA. Please allow 7 days for delivery. Please add carriage. a=£9.99 c=£1.00.



## EPROM EQUIPMENT

UVIPROM is an EPROM programmer for the BBC Micro (with DFS). UVIPROM 1&2 are for 2764/27128 EPROMs (21V Vpp) and the UVIPROM 32&32+ are for 27256 EPROMs (12.5V Vpp).

UVIPROM 1	£20.95	UVIPROM 2 (with ZIF)	£25.95
UVIPROM 32	£21.00	UVIPROM 32+ (with ZIF)	£26.00
Software, including fast algorithm:-	UVP 2.1 ROM		£ 8.00

The compact (90 x 80 x 40mm) UVIPAC EPROM erasers can handle up to 3 EPROMs at a time.

UVIPAC	£21.45	UVIPAC (T) with 15 min. timer	£26.45
UVIPAC (TS) with 15 min. timer and time out sounder			£28.45
EPROMS	1-2	3-9	10 up
2764-25	£2.30	£2.20	£2.10
27128-25	£3.20	£2.90	£2.60
27256.25	£5.00	£4.90	£4.80

Prices include P&P & VAT. Send cheques and orders to:



## GROUND CONTROL

Alfreda Avenue, Hullbridge, Essex SS5 6LT  
Telephone: 0702 230324



AU153A

## WHY NOT INCREASE THE SPEED OF YOUR PC BY USING THE 8087/80287 NUMERIC DATA PROCESSOR

8087/5 Prices 1-10 PCS	£135.00
80287/8 1-10 PCS	£284.00

### UPGRADE YOUR MEMORY

256KDRAM 256K x 1 100+	£2.50
64KSRAM 8K x 8 50+	£2.80

Pace Electronics offer the PC user technical support and advice on the above products.

Pace is a memory distributor company and has memory in stock up to 512K

Pace Electronics Ltd, 84 High Street, Stony Stratford,  
Milton Keynes MK11 1AH.  
Tel 0908 562664 Telex 826679 PACE G



## MEGA-ROM

67 Powerful commands on this 16K Rom. A comprehensive BASIC toolkit, friendly and thorough Rom management, utilities for the disk user including format, verify, repair, editor & search routines.

"Overall a good selection of numerous utilities and a recommended buy at around £35" MICRO USER - JUNE 1986.

NOV' ONLY £29.95

## ROM MASTER

New improved version of our powerful Rom management system.

Now with even more commands to control your errant Roms. This Rom will keep others turned off even through CTRL BREAK. Over 20 commands including the ability to encrypt & de-crypt files to keep them secure from prying eyes.

PRICE £14.95

## VECTOR 1

### TAPE TO DISK UTILITY FEATURES

- + Once only purchase
- + Can save to any disk
- + Very user friendly, help pages on disk
- + 40/80 Format
- + No awkward ROMs, can be used on any machine
- + Can load to all available RAM & 400-7FFF
- = Simply the best tape to disk utility available

Vector 1 versions compatible with Acorn, Opus, UDM, Cumana, BBC+ & Watford (Not 1-42, 1-43 DFS's.)

## VECTOR 2

### DISK UTILITY FEATURES

- + 40/80 Format
- + User friendly, menu driven
- + Contains powerful features such as a disk sector editor, Disk Compare, format, verify and track repair
- = The most powerful disk utility available

**VECTOR 1 & VECTOR 2  
now compatible with  
BBC+ and Master  
series.**

### NEW IMPROVED VERSION (1.40)

Send £2.00 with old disk for upgrade.

Prices: £12.00 each for Vector 1 or Vector 2 £23 for both.

Scythe Toolkit £21.95 (Send for full details)

All prices shown include VAT and p&p. Please add £3.00 per disk if you require 3" disks and specify when ordering.

Orders to:

**CHALICE SOFTWARE, Dept AU**  
3 Merlin Way, Covingham,  
Swindon SN3 5AN.  
Telephone 0793 615026



## GET MORE OUT OF YOUR BBC MICRO WITH SUPERFAST BASIC

BCOMP/MCOMP is a simple to use, powerful BASIC compiler in ROM for the BBC micro which can halve the size and double the speed of your BASIC programs, supports all BASIC keywords except the assembler and has debugging facilities including TRACE and error messages. See BCOMP review in November 1985 Acorn User, Detailed manual included.

BCOMP (BBC B) and manual £34.95  
MCOMP (Master) and manual £39.95

BSIDE/MSIDE is a disk based utility which allows you to create sideways ROMs from BASIC programs compiled using BCOMP. Each ROM may contain up to 20 programs, each with its own '\*' command. Now you can create your own ROMs without using machine code. Floating point variables supported. Supplied on dual format disk with detailed manual.

BSIDE (BBC B) £12.95  
MSIDE (Master) £12.95

Discover the secrets of assembler with DASM, a symbolic disassembler which allows you to investigate machine code programs including sideways ROMs. This disk or ROM based utility, is simple to use yet offers some very powerful features to allow the disassembled code to be formatted for easy reading. User entered symbols are substituted for addresses. Suitable for BBC B or Master (includes 65C102 opcodes).

DASM dual format disk and manual £14.95  
DASM sideways ROM and manual £19.95



Prices include p&p in UK. Send CWD or SAE to:  
Logik Engineers, 84, Portnalls Road, Coulsdon, Surrey, CR3 3DE.  
Tel: Downland 52170.

## WALTHAMSTOW MASTERS

BBC MASTER MICRO  
ACORN PRODUCTS  
DISC DRIVES  
MONITORS  
PRINTERS  
SUPPLIES  
SOFTWARE  
REPAIRS

## MICRO SERVICE

19 Walthamstow Business Centre  
Clifford Road, London E17 4SX  
Telephone 01-531 9070

AA277

## CASIO SYNTHESIZER PLUS BBC MICRO PLUS

## EMR MIDI INTERFACE EQUALS MUSIC, MUSIC, MUSIC

The likes of which your BBC micro has not produced before.  
EMR MIDI INTERFACE & Software for BBC Model B.

- ★ 8 TRACK POLYPHONIC RECORDINGS ★
- ★ MULTI-INSTRUMENT CONTROL POSSIBLE INCLUDING DRUM SYNTHS ★
- ★ PROGRAM FROM THE SYNTH KEYBOARD AT YOUR OWN SPEED ★
- ★ REPLAY VIA THE MICRO AT ANY SPEED ★
- ★ FULL LOOPING FACILITIES ★
- ★ SAVE AND LOAD ALL RECORDINGS ★

**PRICE £129.95 INC CARRIAGE & VAT**  
(State Cassette or 40 Track Disc)

**CASIO SYNTHESIZERS FROM £295 to £795**

All Amazing Value For Money

### DEMONSTRATION TAPE

SEND £1 FOR TDK D60 TAPE WITH SAMPLE RECORDINGS TAKEN FROM CASIO CZ101/CZ230S SYNTHESIZER UNDER BBC MICRO CONTROL. EMR MIDI DETAILS, CASIO LEAFLET & PRICE LIST AND DETAILS OF SPECIAL INTRODUCTORY OFFER. SEND (FOR DETAILS ONLY SEND 50P)

EMR MIDI INTERFACE ALSO AVAILABLE FOR AMSTRAD, SPECTRUM, COM-MODORE 64 AND MSX.

## CARDIGAN ELECTRONICS

CHANCERY LANE  
CARDIGAN, DYFED  
Tel: 0239 614483

CLOSED ALL DAY WEDNESDAY  
EVERYTHING FOR THE BBC MICRO SINCE 1981

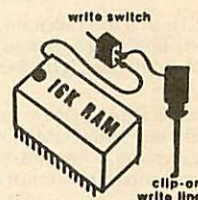
AA236

## BBC MICRO

## RAM MODULES

for TAPE, DISC & NETWORK systems

- ★ Very easy to fit no soldering
  - ★ Plugs into any sideways ROM socket
  - ★ 32K occupies two sockets (2x16K banks)
  - ★ Small size 35x18x14mm fully enclosed
  - ★ Software on Tape/Disc 40 or 80-track compatible with Basic I/II & Networks
- Options include: Load module(s) with ROM data, Save on-board ROMs, View ROM titles with socket positions, Protected ROM option

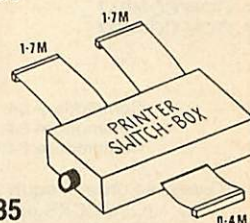


16K £22  
32K £35

Please state: disc/cass

## PRINTER SWITCH BOXES

- ★ Complete with all cables & connectors
- ★ Robust plastic case, size 100x50x20mm
- ★ Quality push action changeover switch
- ★ Selection by colour indicator button
- ★ Printed circuit board construction
- ★ Ready to use just plug in



PS1 2 BBC'S TO 1 PRINTER £35  
PS2 1 BBC TO 2 PRINTERS £38

Free P&P. Send Cheques/PO/Official Orders to:  
TERRELL Electronics, 7b Essex Gardens,  
Hornchurch, Essex RM11 3EH. Tel: (04024) 71426

EDUCATIONAL DISCOUNTS

# BEEBUG

## Retail Manager

We have a vacancy at our St. Albans office for a Retail Manager.

This is a key position and the successful candidate will need manager ment skills as well as a keen interest in the BBC Micro and Master computers. Duties will include day to day supervision of the shop, stock control, purchasing, pricing and customer liaison.

Please send a full CV to The Personnel Manager.

## Programmers

Make money from your hobby.

Now is the time to contact us with your ideas and programs for inclusion in the new Beebugsoft range.

All submissions treated in strictest confidence.

**Beebug, Dolphin Place, Holywell Hill, St. Albans, Herts, AL1 1EX**



# DOUBLE PHANTOM?

YES! This IS the program demonstrated on BBC TV's "Micro Live". The Worlds first micro multi-user combat flight simulation is now available direct from DOCTOR SOFT via our 'HOT LINE' FIRST CLASS MAIL ORDER service.

DOUBLE PHANTOM is basically a TWO computer version of the highly acclaimed PHANTOM COMBAT simulation. At least one BBC must have a disc system. A hardware link (included) then links the machines which become separate aircraft sharing the same airspace, each VISIBLE and VULNERABLE to the other!

DOUBLE PHANTOM has all the usual PHANTOM features including the fastest and smoothest 3D colour graphics around (15fps). RAF Phantom pilot Paul Courtnage's verdict: "Marvellous... quite the best micro flight simulation I've ever seen... Totally captivating!"

Phone: Mail Order Hot line 0903 776000 with VISA/ACCESS. Mail: PO BOX 66, East Preston, West Sussex BN16 2TX. Most orders despatched SAME DAY, FIRST CLASS, POST FREE.

DOUBLE PHANTOM (inc link)	BBC ★	disc 19.95
LINK separately	BBC	cable 9.95
PHANTOM COMBAT	BBC ★	disc 12.95
PHANTOM COMBAT	Electron & BBC	cass 9.95
747	BBC B only	disc 9.95
747	BBC B only	cass 8.95
747	Electron	cass 7.95
747	Commodore 64	cass 12.95
747	Commodore 64	disc 14.95
747	Commodore 64(USA format)	disc 14.95

(Overseas orders, equiv currency, add air mail at cost)

JOYSTICKS optional with all programs

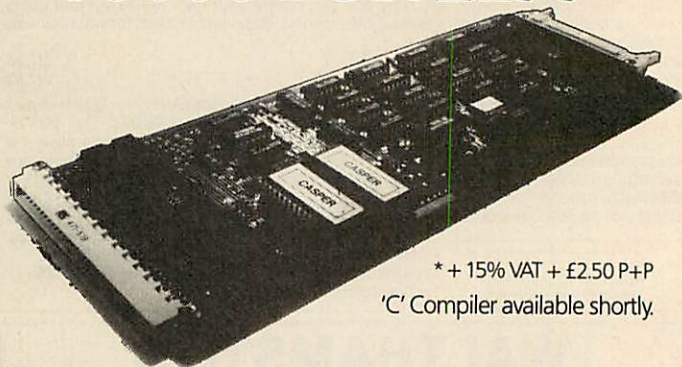
BBC means all machines from 32k up

★ SPECIFY DFS when ordering discs

£2 discount on multiple order

**DOCTOR SOFT - THE FLIGHT SIMULATION SPECIALIST**

# CASPER UPGRADES YOUR BBC TO 68000 FOR £299\*



\* + 15% VAT + £2.50 P+P

'C' Compiler available shortly.

- 68000 2nd processor card with 128K RAM.
- 68000 two pass assembler with system monitor and BBC link software in EPROM.
- Two system diskettes (40 or 80 track).
- Cable and fixings.
- Comprehensive Users Manual covering installation, assembler instructions and teaching guide.



CA Special Products Ltd. Moss Way Donibristle Industrial Park Dunfermline FIFE

INFOLINE for BROCHURE TEL: 0383 823928



# SPIDER 2 REAL-TIME CONTROL FOR THE BBC MICRO

## Watch the SPIDER!

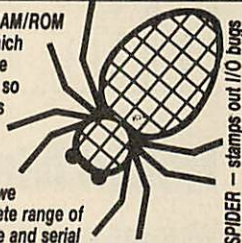
- ★ Powerful new BASIC commands for invoking PROCs from the User Port, Serial Port or the Keyboard.
- ★ 8 independent countdown timers.
- ★ Easy to install with no soldering.
- ★ Comprehensive manual supplied.

## New SPIDER 2 features

- ★ Special keywords for controlling the Serial Port.
- ★ Professional implementation of Foreground/Background processing.
- ★ Reaction timing and pulse trains accurate to 0.1 milliseconds!

from £65 including VAT

SPIDER 2 is a RAM/ROM combination which uses none of the BBC's memory, so BASIC programs are unaffected. The BBC B+ is fully supported and we supply a complete range of digital, analogue and serial interfaces for use with SPIDER using the 1MHz bus. Ask now for details.



SPIDER - stamps out I/O bugs

NOW AVAILABLE FOR BBC MASTER

Paul Fray Ltd

Willowcroft, Histon Road, Cambridge CB4 3JD  
Telephone: (0223) 66529

AA211

# BBC MASTER DUSTCOVERS £4.95

Made from stone-coloured nylon which has been coated with PU to which an anti-static inhibitor has been added. These fabric covers are attractively finished with brown piping and have the computer name Hot Foil printed over the keyboard. They are washable and may be ironed with a cool iron. Similar covers for BBC B.

TAILORED COVERS FOR OAK UNIVERSAL P.C. £8.50

A large selection of matching covers available for printers from £4.50 and monitors from £4.95.

**BBD Computer Dustcovers**  
**The Standish Centre**

**Cross Street**  
**Standish, Wigan**

**Tel: 0257 422968**

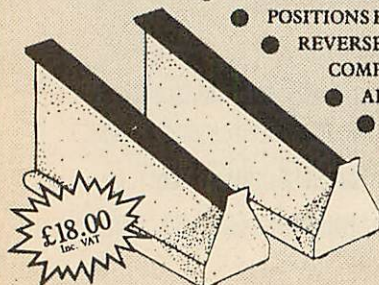


AA216



**RAVEN**

- CONSTRUCTED FROM STEEL SO WILL NOT BEND OR BUCKLE
- WORKS WITH BOTH CENTRE AND BACK FEED PRINTERS
- POSITIONS PRINTER TO GIVE SUPERB VIEWING ANGLE
- REVERSED THE STAND BECOMES IDEAL FOR COMPUTERS AND MONITORS
- ADJUSTABLE TO NEARLY ALL PRINTERS
- SAVES SPACE AND GIVES PAPER STORAGE
- FOAM PADS PREVENT VIBRATION AND SCRATCHING TO DESK TOPS



£18.00  
inc. VAT



Available from TWILLSTAR COMPUTERS Tel: 01-574 5271 or 01-571 5938  
Postage and Packing add £1.50 ACCESS and VISA cards accepted or pay by cheque made payable to: TWILLSTAR COMPUTERS LTD. APEX HOUSE, BLANDFORD RD, NORWOOD GREEN, SOUTHAL, MIDDX UB2 4HD. Showroom open 7 days a week











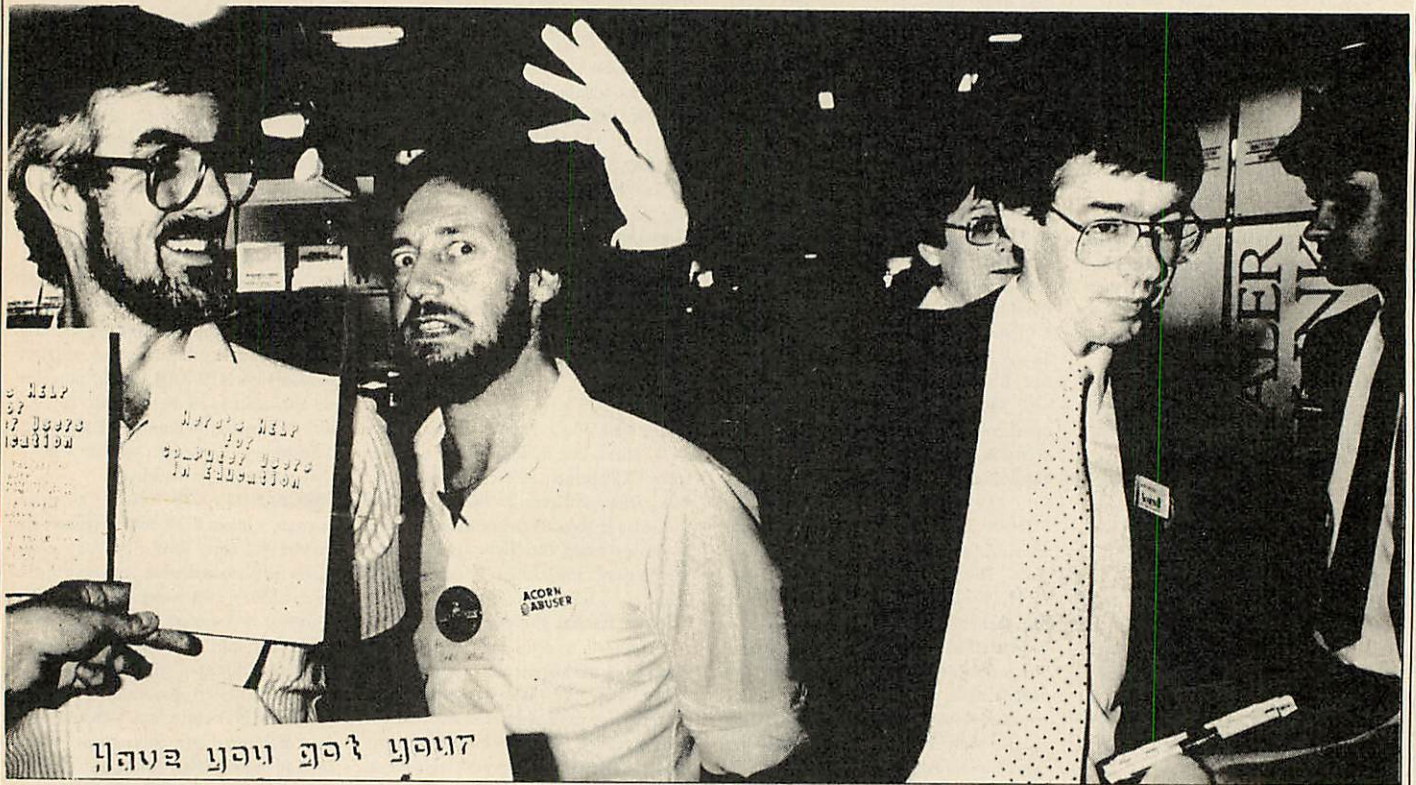
# SMALL ADS

199



# ACORN USER'S

## DIARY



### Shell-shock serenade

The birthday cake has gone, and the 4th Official Baked Bean Can Show is over. Highlight was undoubtedly the Abuser works outing to a trattoria somewhere in darkest Cleveland Street.

Thirsty tired, shell-shocked souls crammed into a restaurant and a good time was had by all.

The evening culminated in Señor Chris Drage strumming away on the classical guitar to the delight of the whole restaurant.

Unbeknown to us all (but revealed here for your delight), Drage spent his early days in the UK (he's a Kiwi) earning a few pennies singing in a local restaurant, and on his first date with his wife Alison left her sitting alone while he serenaded the entire restaurant!

### On your knees

At long last a winner to the anonymous knees competition in the August issue. No, it wasn't Jimmy Hill, though the smile and jawline bear a certain resemblance. It wasn't John Cleese or even old Brucey Smiff, but our education correspondent Nick Evans. Phil Borman's little ode said it all – watch out for it next month. Nick lives just up the road from Phil and will probably be paying him a visit!

Dear old Bob Coates from Acorn had to screw poor Chris Drage's head back on for him after a hard day at the Acorn User Show (above). It's really a bit of photographic trickery (though not done with *Pagemaker*), and forms this month's picture competition. What's your caption? There are Gallery Discs awaiting the best three witticisms.



### Picture power

These fancy art packages like *Pagemaker* have a lot to answer for. Take the picture of Mr Spock here, digitised from the telly, and then 'Pagemakered' by Dave Watts of Essex user group Namebug. Then there's *Artroom* from Clares on the way – just look at the sample of abuse (right) from author Jon Warmisham.

### It's an old copy of ACORN USER???





ALREADY A NUMBER 1 BEST SELLER

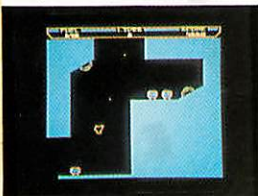
COMPATIBLE  
WITH THE BBC  
B, B+ AND  
MASTER  
SERIES



The first mission — destroy the reactor for a bonus score.



Retrieve the Pod and make your escape.



Collect the fuel and steer clear of the limpet guns.



Shoot the activator to open the sliding entrance door.

#### REVIEWS OF THRUST ALREADY PUBLISHED

**Zzap! 64:** "The most enjoyable game we've played for ages..."

— A ZZAP! SIZZLER.

**Computer & Video Games:** "Thrust is a simple but totally addictive game..." — A C+VG HIT!

#### Now available for the BBC Micro and Electron

The Commodore-64 version of Thrust (published by Firebird Software) shot immediately to No.1 in the software charts and was greeted with rave reviews throughout the computer press. Equally addictive and just as enjoyable, the BBC Micro and Electron versions of the game are set to emulate this performance.

Thrust is simple, fun-to-play, yet totally realistic and intensely challenging. Your mission is to visit 24 planets in turn collecting the Klystron Pods and, if possible, destroying each planet's reactor system. Your spaceship and the pods, which are heavier than the spaceship, move authentically subject to the laws of gravity, inertia and momentum — indeed the game's author, Jeremy Smith holds a First-Class Honours degree in Physics! Careful planning of your manoeuvres is essential in order to prevent the pods swinging out of control and dragging your spaceship to destruction.

To add to the challenge, the planets have different gravity rates and, as you progress through the game, some have "reverse gravity" or "invisible landscapes". They are defended by automatic limpet guns strategically placed to protect the pods and fuel tanks — the only source of replenishment for your limited fuel supply. The smooth screen-scrolling, which is exemplary, and the realistic action gives the player a fascinating feeling of floating through space.

**PRICE: £7.95 (cassette), £11.95 (BBC disc)**

## COMPETITION COMPETITION COMPETITION COMPETITION

If you complete the mission by collecting the pods from all 24 planets, you can enter our competition. The prizes include the beautiful trophy (pictured on the right), £250 cash, and 3 copies of the captivating book "The New Atlas of the Universe" by Patrick Moore. Closing date: 31st January, 1987.



**SUPERIOR  
SOFTWARE**

Limited

Dept. TH2, Regent House,  
Skinner Lane,  
Leeds LS7 1AX.  
Telephone: 0532 459453.



24 HOUR TELEPHONE  
ANSWERING SERVICE FOR ORDERS

- OUR GUARANTEE**
- All mail orders are despatched within 24 hours by first-class post.
  - Postage and packing is free.
  - Faulty cassettes and discs will be replaced immediately.



BBC  
MICRO

ELECTRON

**WE PAY TOP ROYALTIES FOR HIGH QUALITY SOFTWARE**



# GALAFORCE



Big Dipper formation



Crazy Funnel formation



The Deck of Cards



Acorn Electron version



Compatible with the  
BBC B, B+, Master  
and Master Compact  
computers

BBC  
MICRO

ELECTRON



## GALAFORCE for the BBC Micro, Master Series, and Acorn Electron

In the midst of the 25th century, the United Cosmological Federation declared war on the savage, belligerent aliens inhabiting the Magellanic galaxy. Only the most experienced of the U.C.F. pilots were chosen to embark upon the perilous mission of conquering and overthrowing the hordes of Magellan, the Galaforce.

Little is known of the inner zones of the galaxy, but on reaching the perimeter of Magellan all intruders are met with spectacular, non-hostile warning displays. However, venturing further will incite the aliens' wrath. Few and awestruck are the pilots who have returned from within — they have identified 10 types of fearsome alien: the most powerful being the scaly-skinned Calliston.

In common with the warmongering galaxies of yesteryear, the Magellanic aliens appreciate the maxims of "safety in numbers" and "strategy before action" — they always fly in selected preconceived formations. Surviving pilots have logged many such formations, and the pilots have given the formations laconic names: the Big Dipper, the U-Turn, the Staircase, Purple Rain, the Ski-Jump, the Corkscrew, Barbed Wire. Only one pilot has ventured beyond the 8th zone and survived — now retired from active service, he relates stories of a perplexing formation which he named the Snaker.

The U.C.F. is now offering rewards to pilots for supreme acts of bravery within the Magellanic galaxy. Fast reflexes, trigger-happiness and a degree of calm cunning are required by all prospective pilots.

The game features include: 8-directional movement of the player's spaceship; fast and slow-speed bombs which home in when later zones are reached; keyboard and joystick control options; self-play demo mode; high-score tables; and superb atmospheric music.

**PRICE: £9.95 (Cassette), £11.95 (BBC 5¼" disc), £14.95 (BBC Master Compact 3½" disc).**

**PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES**

To encourage pilots to venture forth further into Magellan, a substantial reward has been offered for the first pilots to cross the outer 48 zones of the galaxy. The successful competitors will be entered for a prize draw, the winner receiving a radio-controlled aeroplane worth £300. Two runners-up will each receive a £10 consolation prize and a trophy. Closing date: 31st March, 1987.



**SUPERIOR  
SOFTWARE**  
Limited

**ACORNSOFT**

Dept. GF1, Regent House,  
Skinner Lane,  
Leeds LS7 1AX.  
Telephone: 0532 459453.



24 HOUR TELEPHONE  
ANSWERING SERVICE FOR ORDERS

### OUR GUARANTEE

- All mail orders are despatched within 24 hours by first-class post.
- Postage and packing is free.
- Faulty cassettes and discs will be replaced immediately.